Canada. Bureau of North West
Territories & Yukon Affairs

Northwest territories & Yukon affairs

DEPARTMENT OF THE INTERIOR

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NORTH WEST TERRITORIES AND YUKON BRANCH

O. S. FINNIE, *Director*

THE NORTH WEST TERRITORIES 1930

By

F. H. KITTO, F.R.G.S.

OTTAWA
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PRINTER TO THE KING'S MOST EXCELLENT MAJESTY
1930

NORTHWEST TERRITORIES

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Keewatin District,.. .. ..

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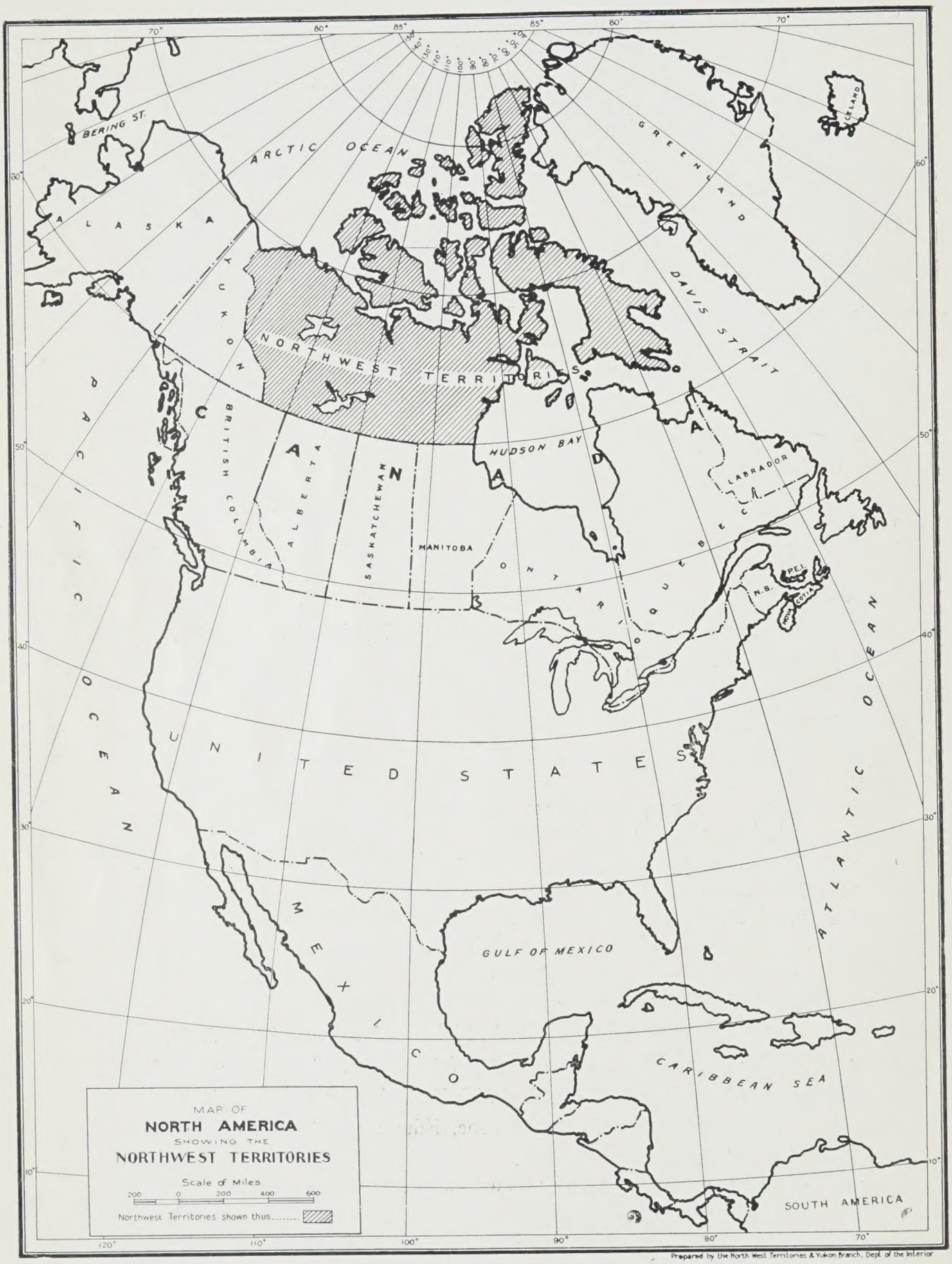
BERING ST.
ARCTIC OCEAN
GREENLAND
ICELAND
ALASKA
YUKON
NORTHWEST TERRITORIES
DAVIS STRAIT
BRITISH COLUMBIA
ALBERTA
SASKATCHEWAN
MANITOBA
HUDSON BAY
ONTARIO
QUEBEC
LABRADOR
P.E.I.
N.S.
N.B.
PACIFIC OCEAN
UNITED STATES
ATLANTIC OCEAN
GULF OF MEXICO
MEXICO
CARIBBEAN SEA
SOUTH AMERICA
MAP OF
NORTH AMERICA
SHOWING THE
NORTHWEST TERRITORIES
Scale of Miles
200 0 200 400 600
Northwest Territories shown thus.....
Prepared by the North West Territories & Yukon Branch, Dept. of the Interior

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Foreword

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EVENTS of 1929 focused attention on the North West Territories. This year many enterprising pioneers will journey into the remoter hinterland to explore the possibilities which seem to promise so favourably. Particularly do we expect great things from the district tributary to the Mackenzie and Coppermine rivers. It seems an opportune time for the publication of the information resulting from the work which this department has done during the past few years, and I trust that this concise compendium of our most accurate information on the extent, topography, population, resources, climate, transportation facilities and governmental organization of the North West Territories will be of interest and use.

W. W. CORY,
Commissioner, N.W.T.

THE NORTHWEST TERRITORIES

1930

THE NORTHWEST TERRITORIES AS A WHOLE

GENERAL DESCRIPTION

IT is a common practice to refer to the Dominion of Canada as a confederation of provinces extending from the Atlantic ocean to the Pacific ocean; but it is realized by comparatively few people that additional northerly territories comprise more than two-fifths, and the provinces less than three-fifths, of the whole area of Canada. Over six-sevenths of this northerly part of the Dominion is included in the area known as the Northwest Territories: the other portion forms a separate division known as the Yukon Territory.

LOCATION AND EXTENT

The Northwest and Yukon Territories embrace all of the mainland of Canada west of Hudson bay and north of the 60th parallel of North latitude; all of the islands in Hudson and James bays and in Hudson strait; and all of the Arctic islands north of the mainland of Canada. These northerly islands have been defined as those within the area bounded on the east by a line passing midway between Greenland and Baffin, Devon and Ellesmere islands, to the 60th meridian of longitude, following this longitude to the Pole, and on the west by the 141st meridian of longitude, following this longitude to the Pole.

The Yukon Territory includes an irregular shaped area comprising the northwesterly corner of the mainland of Canada, north of the 60th parallel and west of the general trend of the main Rocky Mountain range, together with the islands within twenty miles of its northerly coast. It has an area of 207,076 square miles and was made a separate territory in 1898 as a result of its Klondike gold rush.

With this exception the Northwest Territories embrace all that vast part of Canada lying north of its several provinces. For purposes of organization and administration they are divided into three districts—Mackenzie, Keewatin and Franklin. Mackenzie District includes that part of the mainland lying between the 102nd meridian of longitude and the Yukon Territory; Keewatin includes that part of the mainland, except Boothia and Melville peninsulas, lying between Mackenzie Dis-

trict and Hudson bay, together with all islands in Hudson and James bays; and Franklin District includes Boothia and Melville peninsulas and all islands in Hudson strait and in Arctic waters within the boundaries mentioned, except those adjacent to the Yukon coast.

Generally speaking, Mackenzie may be said to lie to the north of Alberta and Saskatchewan; Keewatin to lie to the north of Manitoba; and Franklin to comprise Canada's Arctic islands. In similar manner Yukon may be said to lie to the north of British Columbia.

The mainland of the Northwest Territories lies approximately between the 60th and 70th parallels of North latitude. Within this belt are found all, or the major portions, of the following lands: southern Greenland, Iceland, the Shetland islands, Norway and Sweden, Finland, northern Russia and Siberia, and Alaska. Other Arctic lands in latitudes corresponding roughly to those of Franklin District are northern Greenland, Spitzbergen, Franz Josef Land, Nova Zembla, and the northerly part of Siberia.

The areas of the three Districts of the Northwest Territories are shown in the following table, and, for comparative purposes, the areas of the Northwest and Yukon Territories and of the whole of Canada. Water areas are exclusive of tidal waters.

TABLE OF AREAS IN SQUARE MILES*

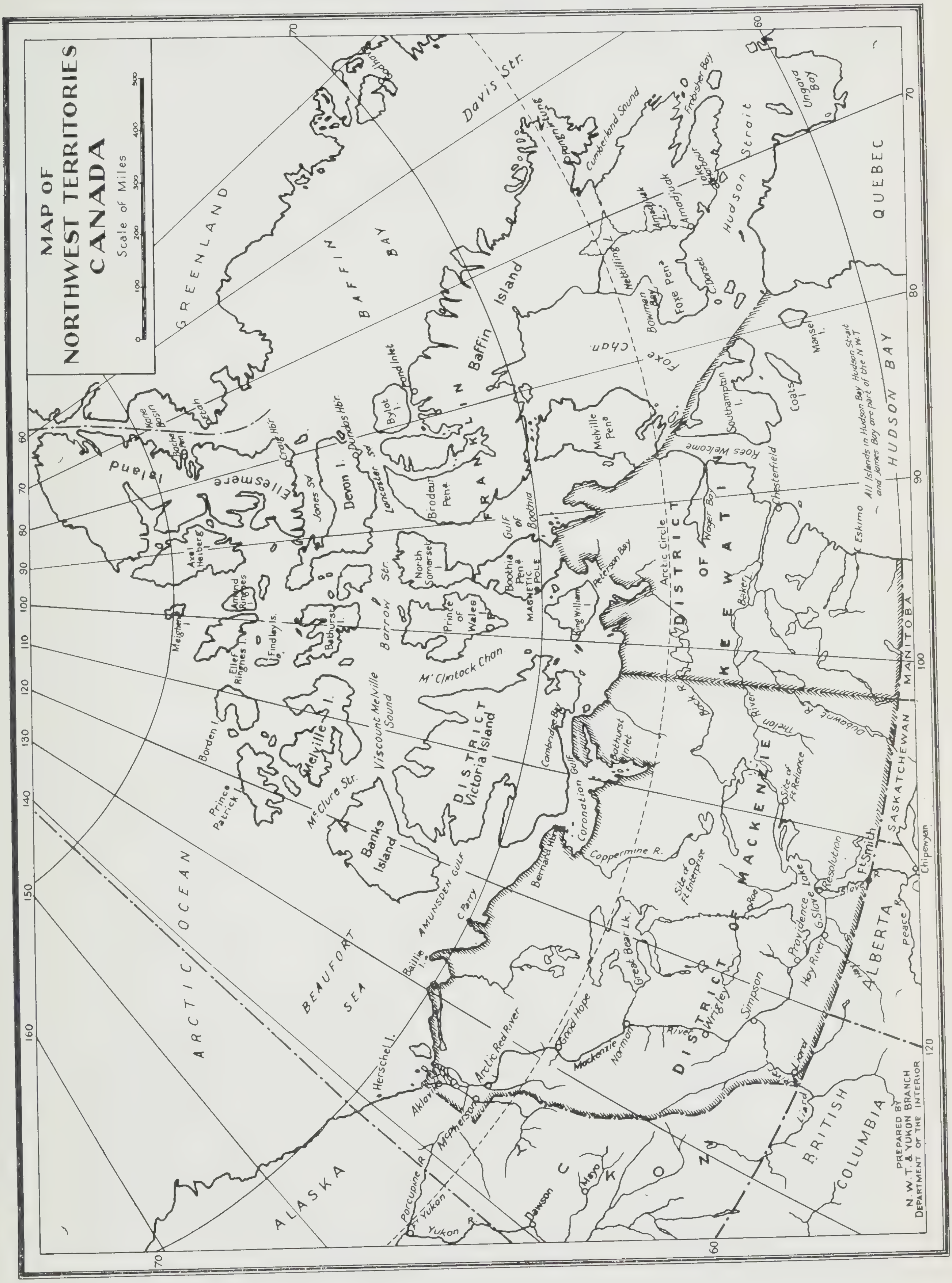
Division	Land area	Water area	Total area
Mackenzie District	493,225	34,265	527,490
Keewatin District	218,460	9,700	228,160
Franklin District	546,532	7,500	554,032
Total—Northwest Territories	1,258,217	51,465	1,309,682
Yukon Territory	206,427	649	207,076
Total—Northwest and Yukon Territories	1,464,644	52,114	1,516,758
Canada	3,542,049	142,674	3,684,723

*Canada Year Book 1929.

From these figures it is seen that the area of the Northwest Territories, not including Yukon, is more than one-third that of the whole of Canada. It is also more than one-third that of the United States and its dependent territories, more than ten times that of the British Isles, and six times that of France.

PHYSICAL CHARACTERISTICS

To most people the geography of the Northwest Territories is rather hazy, but with each District is associated one particular feature at least. The great Mackenzie River system, with its far-reaching tributaries and its great lakes distributed over a vast watershed that drains to the Arctic coast, is the dominating feature of Mackenzie District.


MAP OF
NORTHWEST TERRITORIES
CANADA
Scale of Miles
GREENLAND
BAFFIN BAY
Davis Str.
Baffin Island
Hudson Strait
QUEBEC
HUDSON BAY
Foxe Chan.
Ellesmere Island
Devon I.
Victoria Island
Banks Island
Melville I.
ARCTIC OCEAN
BEAUFORT SEA
ALASKA
YUKON
BRITISH COLUMBIA
ALBERTA
SASKATCHEWAN
MANITOBA
DISTRICT OF KEEWATIN
DISTRICT OF MACKENZIE
DISTRICT OF FRANKLIN
Arctic Circle
Great Bear Lk.
Coppermine R.
Coronation Gulf
M'Clintock Chan.
Viscount Melville Sound
All Islands in Hudson Bay, Hudson Strait and James Bay are part of the N.W.T.
PREPARED BY
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DEPARTMENT OF THE INTERIOR

With Keewatin are associated the Northern Plains that were mentioned with much frequency in the press during recent searches by aeroplane for missing aviators in those regions. Franklin District naturally calls to mind Canada's far northern possessions—the Arctic archipelago.

The topography of the Northwest Territories emphasizes the vastness of space and the immensity of areas involved. Great lakes and mighty rivers are set in plains that appear boundless. Long, low ranges of irregular hills, separated by valleys with winding rivers and lakes of every shape, succeed each other with monotonous regularity. An expansive mainland and an ocean studded with great islands presents a scene in which space is the predominating feature. The treeless condition of most of this area, a scanty population and an Arctic or sub-Arctic climate accentuate this impression.

During recent years exploring and prospecting have been initiated in almost every section of the whole region. By deep-sea vessels, river steamboats, canoes, dog sleds and aeroplanes the resources of the country are being sought out and its geography revealed. In a few years the map of the North will be as complete and as familiar to the average student as that of any other part of Canada. The principal characteristics that will be revealed by the examination of a relief or contour map of the mainland, when one is available, reading from left to right, or from west to east, will be somewhat as follows:—

First will be seen a continuation of the Rocky Mountain system, its summit separating the Yukon Territory and Mackenzie District. The elevation of this range will be observed to fall away towards the north and disappear near the Arctic coast. From its higher parts, rivers will be noticed running easterly to a low, broad valley, a continuation of the plains district of northern Alberta.

Through this valley the Mackenzie river will show up prominently, running in a general northwesterly direction. On its course, or tributary

WATERFRONT AT FORT SMITH

Fort Smith, on Slave river, is the head of steamboat navigation on the Mackenzie system of waterways extending to the Arctic coast, a distance of 1,300 miles.

to it, Great Slave and Great Bear lakes will attract immediate attention because of their great size. Parallel to the river and between these lakes a couple of mountains appear as spears or offshoots of the main range on the opposite side of the river.

Farther east it will be observed that the level forested lands of the valley are giving way to hilly, rocky country, with fewer trees and numerous lakes and rivers of very irregular shape or direction. This country will be recognized as a continuation of the rocky formation of northern Saskatchewan and northern Manitoba. The drainage will be seen to be divided for a distance between the Mackenzie river and the Arctic coast, and then between the Arctic coast and Hudson bay. Many irregular ranges of broken hills will be observed but of insufficient height to be classed as mountains.

Approaching Hudson bay the land will be seen to fall away gradually so as to leave a comparatively low shoreline in which several deep inlets are prominent. The Arctic coastline likewise will appear low and very irregular, being broken by numerous inlets and promontories which interlock with the adjacent Arctic islands.

The Geological Survey of Canada has outlined the approximate boundaries of the main geological divisions of these regions. The relationship between the surface features and the underlying structure, as described in the following three paragraphs, is from this source:—

"The physical features of the Northwest Territories on the mainland are of two dominant types—the Laurentian plateau and the Mackenzie lowland. The Laurentian plateau, which is underlain by rocks of Precambrian age, has a rocky, irregular, hummocky or mamillated surface with relief rarely exceeding a few hundred feet. It is much denuded of soil and, in general, treeless.

"The western boundary of the Laurentian plateau follows approximately Slave river, the north arm of Great Slave lake, and a line extending northward to Great Bear lake. West of this lies the Mackenzie lowland, a continuation northward of the great central plain of North America. It is underlain in great part by nearly flat-lying Palaeozoic limestones and shales which are in places concealed beneath Mesozoic and Tertiary sandstones and shales. The lowland has a gentle slope to the northwest and holds on its forested surface a great many lakes and muskegs drained by small streams meandering through shallow valleys. The monotony of the general level of the lowland is relieved by a few hills and mountains rising to a height of a few thousand feet, such as Franklin mountain and Horn mountain.

"The Laurentian plateau extends northeastward through Baffin and North Devon and into Ellesmere island. Here it rises to heights of 4,000 and 5,000 feet. The islands of the Arctic archipelago to the westward are composed of later sediments and are less elevated and less rugged."

Prevailing misconceptions respecting the general nature of the Northwest Territories have been less, perhaps, in relation to its physical characteristics than to its vegetation, climate and living conditions. While it has been comparatvely easy to visualize the geographical location, extent and principal land and water features of these regions, it has been difficult to disassociate from them the impressions of prevailing snow and ice and barrenness that records of hardships and disasters experienced by early explorers and the frequent use of such terms as "frozen North" and "barren grounds" have created.

The forests of a country are described, usually, in connection with its natural resources. In the case of the Northwest Territories the forests, except in certain restricted areas, do not constitute a major commercial

resource. They are of little significance except for local purposes, which of course are intensified by the latitude of the region. But without a general knowledge of the vegetation of the country no adequate grasp of its true nature can be conceived. The following brief survey of forests and vegetation is given, accordingly, for its general descriptive value.

FORESTS AND VEGETATION

That part of the Northwest Territories embraced within the Mackenzie watershed may be classed, broadly speaking, as forested country, and the remaining areas may be included in the Arctic treeless zone. The Mackenzie forests are a northerly extension of the coniferous forest belt of Western Canada. The northerly limit of this belt is not determined by climate alone but by soil and to a very large extent by drainage also.

On the west shore of Hudson bay the forest belt extends about as far north as Churchill, which is in Manitoba, and approximately 100 miles south of the southerly boundary of Keewatin. The longitude of Churchill is approximately 95° West and its latitude is less than 59° North. In longitude 125° West, the forests reach slightly beyond a latitude of 69° North or nearly to the Arctic coast. The northerly limit of the forest belt is seen, therefore, to follow a northwesterly course, thus indicating that better conditions for tree growth prevail in the more westerly parts of the Territories.

The demarcation between wooded and treeless areas is very irregular. Here and there fringes of trees are found growing along the banks of rivers far beyond the main forest body. Again, isolated clumps of trees flourish here and there in favourable localities. Very approximately, the northerly limit of forests might be said to run from Churchill to Dubawnt lake, thus including the southwest corner of Keewatin District. It then skirts the east end of Great Slave lake, with a long arm running out along the Hanbury and Thelon rivers; follows the general direction of the Coppermine river; passes close to the northeast end of Great Bear lake; approaches the Arctic coast in longitude 125° West as previously mentioned, and parallels it at a distance of from 50 to 100 miles to the Mackenzie delta and Yukon Territory.

The islands of James bay, which form part of Keewatin District, are also in the forest belt. Franklin District has no woods except willows and other shrubs.

The principal trees of the Northwest Territories are the white spruce, black spruce, jack pine, tamarack, balsam poplar, aspen poplar and canoe birch. There is considerable underbrush consisting of alder, dwarf and ground birch, several species of willow and juniper, as well as berry bushes and other shrubs. Small willows are found on the banks of nearly all lakes and streams in the treeless areas as well as along the main Arctic coast and on all, or nearly all, the Arctic islands.

The white spruce is the most common species of all these trees. It attains a larger size than any of the others and is individually and collectively the most valuable. It flourishes along the rich alluvial banks of the Slave and Mackenzie rivers and their tributaries, in favourable spots on the Slave attaining a diameter of over 2 feet and a height of 100 feet. Even as

SPRUCE LOGS IN MACKENZIE DISTRICT

Local white spruce is the source of nearly all lumber used in Mackenzie District.

far north as Great Bear lake and the Mackenzie delta it sometimes attains a diameter of 18 inches. In outlying and exposed sections it grows in more stunted form, depending on local conditions.

The black spruce extends northward nearly to the limit of the wooded regions but it is inferior in size and quality to the white spruce. It grows mainly in muskegs and poorly drained areas.

The jack pine, or Banksian pine, is quite plentiful in the southern part of Mackenzie District. Many trees have been observed with diameters of 18 inches but the average is probably about half that. It flourishes in groves on sandy ridges and is found also in mixed stands with poplars and other trees.

Tamarack is found chiefly in muskegs, where it is sometimes the predominating tree, nearly as far north as the limit of the black spruce.

Both balsam poplar and aspen are found extensively throughout the southwesterly part of Mackenzie District and as far north as the Mackenzie delta. On the Slave and Liard rivers, the south shores of Great Slave lake, the Mackenzie river as far as Simpson, and on smaller rivers in these parts, both species grow to be large trees. In the Mackenzie delta, on the shores of Great Bear lake and towards the east end of Great Slave lake, near the limits of the general forest area, the poplars appear as dwarfed trees or attain only a small size.

The canoe birch is common throughout the wooded region and is an economically important tree along the Mackenzie River system as far north as the delta. On the south shore of Great Bear lake it attains a fair size.

The vast treeless area north of the great coniferous forest has been known commonly in Canada as the " barren grounds ". Samuel Hearne, the first white man to penetrate these regions, originated this name more

than 150 years ago. To Hearne this great, northern country, on account of the absence of trees, appeared barren. Modern travellers, however, agree that Hearne's conception was erroneous, since, in most places within the Arctic, a fairly prolific vegetation occurs. Ellesmere island, the second largest of the Canadian Arctic islands, extends from latitude 76° to 83° North and its most northerly point, cape Columbia, is but a little over 400 miles from the Pole. Notwithstanding its latitude, botanists have recorded from this island more than 125 species of flowering plants, and the number of cryptogamic plants, such as algae, mosses, lichens and fungi, probably much exceeds 500 species. As the result of official investigations the name has been changed to Northern Plains.

Everywhere on the Northern Plains where sufficient soil has been accumulated, abundance of plant life is found every season.

The influence of the polar sea, with its great masses of drift ice, considerably affects the climate and therefore also the plant life in the vicinity of the coast. During the short season of growth the coastal belt receives a fair amount of precipitation in the form of rain and snow, but also mostly as fog, while farther inland the influence of the sea is not felt and the climate, therefore, is more continental or warmer and drier.

The damp cold near the seashore is detrimental to tree growth even in its most dwarfed form, but grasses and herbaceous plants flourish here, and often form extensive Arctic meadows of rather short, but very nourishing, grasses and sedges.

EDGE OF NORTHERN PLAINS

Northern Plains east of Great Slave lake showing limit of forest belt. Lone caribou facing photographer.

The influence of the ocean is seldom felt more than 50 to 75 miles inland. Here the ground is occupied by extensive heaths or moors on which Labrador tea, Arctic rhododendron, ground birch, blueberry and the Arctic cranberry are common. In well-protected places, such as sheltered valleys where sufficient snow accumulates during the winter and thus insures protection from the wind, the ground birch and the Arctic willows grow upright and form little copses or thickets. The ground is almost everywhere covered with a thick, soft carpet of various kinds of mosses and lichens. The latter, together with the young shoots of the willows and small scrubs, form the bulk of the forage of the large herbivorous animals of the Northern Plains, the musk-ox and the caribou, during the winter.

The season is short in the Arctic and, therefore, most of the Arctic plants are early flowerers, and even before the snow has entirely disappeared from the ground the first flowers are in bloom.

About the middle of June the Arctic tundra looks its best. Beautiful blue lupines, which in colour and splendour almost challenge the domestic varieties, sometimes cover acres of ground. Yellow Arctic poppies, white and red saxifrages, blue forget-me-nots and many other species of attractive plants are equally as plentiful.

A month later most of the willows have gone to seed. Towards the end of August the first snow usually comes and the leaves of the deciduous shrubs begin to fall.

OTHER NATURAL RESOURCES

The known natural resources of the Northwest Territories include, in addition to forests, a wide range of wild life (the basis of an extensive fur trade), minerals, water-powers and arable and grazing lands. While information concerning the extent of these resources is far from complete, a review of available data discloses their presence in many forms and localities, and suggests the possibility of developing important industries based on them. It is significant that the Eskimos and the Indians have been able to sustain themselves for hundreds of years along the Arctic coasts and in the interior and that the general trend of northern development shows no sign of halting at the borders of the Territories.

The fur trade of the Territories has flourished for over 125 years and is to-day their principal commercial enterprise. Even before this trade had spread to any great extent, the whaling industry was prosecuted in Hudson bay and Arctic waters, but it has fallen away during the last half century. The wild life, including particularly the game and fur-bearing animals of economic value, is reviewed in a following section.

The mining possibilities of the Territories are receiving much attention and it is freely predicted that the mineral wealth of these regions may shortly become the principal source of enterprise. Known minerals include coal, oil, gas, gypsum, copper, gold, silver, lead, zinc, mica and other occurrences.

Water-power resources are extensive and widely spread.

The arable lands of the Territories are limited to favourable localities in Mackenzie District. Extensive grazing areas are found in all three Districts. These grazing lands have supported millions of caribou as long as the white man has had any knowledge of them. Large herds of

musk-oxen also found pasturage in the northern parts and the American bison formerly ranged as far north as the west end of Great Slave lake. The utilization of these natural grazing lands for the raising of domesticated or semi-domesticated reindeer, musk-oxen or other hardy grazing animals suggests a greater possible development in the Northwest Territories than that which might accompany the exploitation of any other resource.

Further particulars of the resources of each of the three Districts of Mackenzie, Keewatin and Franklin are given in greater detail in sections that follow.

CLIMATE

The Meteorological Service of Canada has perfected arrangements for securing various forms of weather records from a series of stations throughout the Northwest Territories. The number of these stations is being increased from time to time. Some of the records are of several years duration; others are more recent. In addition to its own records this service has been fortunate in securing many others dating back over a long period of years from traders, whalers, explorers, missionaries and other observers. From a number of stations, records are now received twice daily by wireless; other stations can send returns only once a year.

On the whole the Service has accumulated a great deal of authentic information and is in a position to deal comprehensively with the subject of climate generally. Space does not permit the reprinting here of data that is available from this source.

The following brief notes on the climate of the Mackenzie valley and of Keewatin District are compiled from a non-technical standpoint. The observations respecting climatic conditions on the west coast of Hudson bay are as quoted by G. H. Blanchet, B.Sc., Topographical Survey, Department of the Interior, on his return after spending a year and a half there in connection with aerial prospecting operations.

The climate of Mackenzie District is more moderate than its latitude would suggest. This is particularly true of the summer seasons. Charts of summer isotherms show the 55 degree line, which passes just a few miles north of Port Arthur, Ontario, as swinging northward to include the Mackenzie valley as far as Good Hope and the Arctic Circle. The low parts of the District forming the Mackenzie valley proper and belonging to the Great Plains region of Canada appear to be favoured with an exceptionally agreeable climate. The presence of large bodies of water, the mantle of forests covering the land areas and the general low altitude of the valley are important factors in this connection.

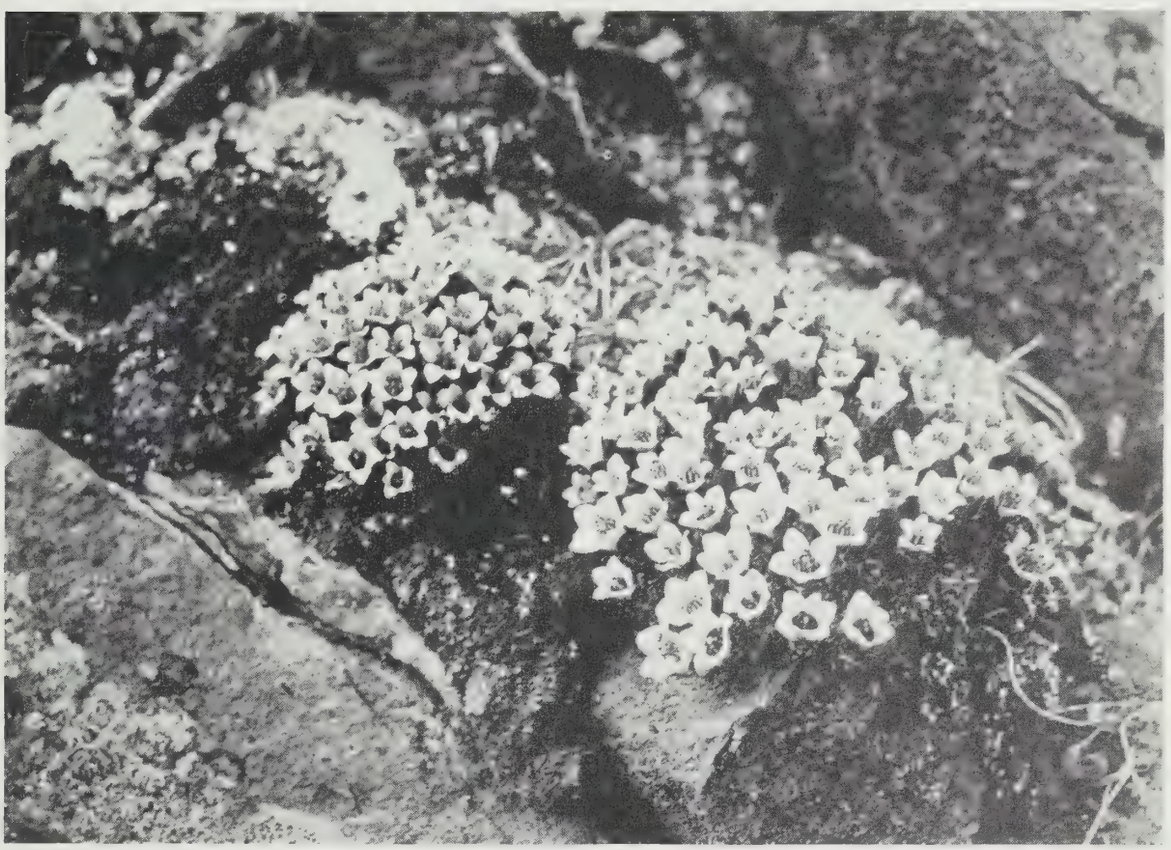
Winter seasons conform somewhat closer to latitudes. The weather, however, except on the coast and treeless lands, is not unduly severe. As far north as Simpson, the thermometer seldom falls below 50 degrees below zero and the average minimum is very moderate. Severe storms or blizzards are not as frequent as on the open prairies.

The summers are remarkable for their long days of sunshine thus giving a rapid, though short, growing season. A three months' period of daylight is experienced in all parts of the District, and north of the Arctic Circle the midnight sun is a feature of note. At Simpson, which

might be considered the northern extreme of a local agricultural belt, the average possible number of hours of sunshine daily during the whole summer season is nearly 18.

Precipitation is moderate. The winter snowfall is seldom deep, averaging two feet except in the mountains, where it is more. The rainfall is slightly higher than in the Prairie Provinces and is fairly uniform. The total precipitation is probably sufficient for farming purposes where suitable lands are available.

The effects of the Chinook winds are said to be felt on the Liard river and as far north as Simpson. Winds are more prevalent in the northern regions and add a bitterness to the Arctic winters not felt in the southern parts.



PURPLE SAXIFRAGE ON NORTHERN PLAINS

The purple saxifrage is usually the earliest Arctic flower to bloom in the spring.

There is a certain change of climate proceeding inland from the Hudson Bay coast but it is in degree rather than in seasonal phenomena. The cold waters of Hudson bay keep the summers cool, while the mists that rise from the open sea in spring and fall have a moderating effect on the coastal climate.

In general the temperature varies from cool to cold without extremes and without sharp local variations.

The spring season includes the period from the middle of April to the end of June. The mean temperature climbs from zero to about 40 above, the snow slowly disappears and vegetation revives and grows rapidly

towards the end of June and quickly ripens during July. During August strong winds become more frequent and the mean temperature drops somewhat but without frosts.

By the middle of September fall has set in, ponds start to freeze and snow flurries may occur. Ice sets on the large lakes during the latter part of October and sufficient snow has accumulated on the land to cover all but the boulders and rocky ridges. With the freeze-up much of the misty condition of the fall disappears and bright sharp weather characterizes the period up to the setting in of the heavy cold about the middle of December.

The variable winds of spring and summer settle more and more to the northwest as winter advances and periodically northwesterly gales sweep across the country, driving the snow and building up drifts in the lee of all obstructions.

Snowfall is light during the winter and in general the level land is lightly covered until the break of the cold weather in April when heavy snow storms come with south and east winds.

This generalization applies particularly to latitude 62 and would be somewhat modified proceeding north or south. During the season of growth the continuous daylight causes rapid development and many grasses, flowers and shrubs flourish on the low lying plains and hillsides. While the climatic conditions restrict travel during certain seasons, the ordinary occupations of life may be carried on in the settlements with comparatively little interruption.

HISTORICAL SKETCH

The history of the Northwest Territories of Canada is practically as long, and in many respects fully as interesting, as that of any other part of the New World. True, it does not include such struggles and conflicts for colonial supremacy as feature the histories of more southerly regions, but its long array of gallant undertakings, courageous struggles and heroic sacrifices in the interests of discovery and science make fascinating reading.

There are two phases of the history of the Northwest Territories worthy of special mention. One is that British claims to these regions were firmly established by right of original discoveries and have been maintained continuously by explorations and occupation. The other is that the principal motive which prompted centuries of effort in solving the mysteries of these northern regions was the desire to give to the world a better knowledge of their geography and natural history.

SEARCH FOR A "NORTH-WEST PASSAGE"

When Columbus set sail on his famous voyage of 1492 he hoped to pioneer a direct western route to the Orient. His discovery of land brought the principal marine nations of Europe quickly upon the scene and the history of the New World began. But the original hope of a western sea route to the rich countries of the Far East was not abandoned. The mainland of America proving a barrier, the search for a possible passage through it began.

Rumors of a "North-West Passage" soon became current and for centuries there were put forth intermittent efforts, particularly by England, with a view to its discovery. Though long before the coast lines of North America were fully explored it became apparent that there existed no passage suitable as a commercial route, the desire to solve the geographical mysteries of the North prevailed, and success in this respect was finally achieved.

The search for the "North-West Passage" was commenced actually more than four and a quarter centuries ago when Cabot, in his second voyage to America in 1498, is believed to have coasted as far north as the entrance to Hudson strait. The story of the searches and explorations that followed cannot be told in the compass of these pages. The history of northern Canada records the voyages and discoveries of upwards of 150 scientific expeditions, each of which is productive of one or more extensive volumes of reports. Very briefly, some of the most fruitful events and their bearings on the future of the North might be mentioned.

Following Cabot came Frobisher in 1576-77-78; Davis in 1585-86-87; Weymouth in 1602; and Henry Hudson, who in 1610 traversed the length of Hudson strait and discovered the great bay that, as well as the strait, bears his name. Though Hudson perished on this voyage, his discovery had far-reaching results. It gave to Britain the control of the great Hudson Bay country and the Northwest Territory of the New World.

Following close in Hudson's wake came Button in 1612, Bylot and Baffin in 1615, Munk (a Danish navigator) in 1619, Foxe in 1631, and James in 1631-32. These expeditions confirmed and extended Hudson's discoveries in Hudson and James bays and dispelled a growing belief that a "North-West Passage" opened from these waters.

THE FUR TRADE AND OVERLAND EXPLORATIONS

The exploration of Hudson bay proved disappointing from the standpoint of those who sought a navigable passage to the West. It reacted in halting for many years further search by sea but it opened up the way for the establishment of a great trade in furs with the natives of the adjacent regions. Profitable as this trade proved to private interests, it was of far greater national value in that its prosecution by her subjects maintained Great Britain's claims by right of discovery to these extensive territories.

The history of the Hudson's Bay Company is well known. Incorporated in 1670 it secured and exercised what was practically an exclusive and sovereign right of commerce over all that huge territory draining into Hudson bay and strait and named by it "Rupert's Land" in honour of its first governor. Amalgamated in 1821 with its great rival, the North-West Company of Montreal, its fields of trade were extended to include the whole of the mainland of Northern Canada. In 1869, by agreement, Great Britain terminated the special privileges it enjoyed and the following year, two hundred years after granting the original charter, transferred all of Rupert's Land and the "North Western Territory" to Canada. The Company retained its posts and certain specified lands and still carries on an extensive fur trade and general mercantile business.

Step by step, as explorers and fur traders penetrated the great interior, the general geography of the country became fairly well known. With respect to those portions of the mainland included in the present boundaries of the Northwest Territories, there are three names that stand out prominently among those of its original explorers. These are Hearne, Mackenzie and Franklin. Hearne was an officer of the Hudson's Bay Company, Mackenzie a partner in the North-West Company, and Franklin a British Naval Officer.

During the years 1770-72 Samuel Hearne made a journey from Fort Prince of Wales, Churchill, to the Coppermine river and the sea coast at its mouth, returning by way of Great Slave lake. The objects of his expedition were the discovery of reported copper deposits and information bearing on the North-West Passage.

In 1789 (Sir) Alexander Mackenzie set out from his headquarters at Chipewyan on lake Athabaska and followed a chain of waterways culminating in the Mackenzie river (so named in honour of him) to the Arctic coast.

To secure more scientific data respecting these regions and to survey the Arctic coast from Hearne's and Mackenzie's points of visit, Sir John Franklin led two notable overland expeditions to the North during the years 1819-22 and 1825-27. As a result of the explorations and surveys of these three men and of others who carried on Franklin's surveys, particularly Richardson, Back, Rae, Dease and Simpson, the northerly part of the mainland became fairly well mapped nearly a hundred years ago.

ARCTIC DISCOVERIES AND EXPLORATIONS

The exploration of the Arctic islands was actively resumed by sea early in the nineteenth century. Of the many expeditions that sailed into these icy waters, probably that led by Sir John Franklin is the most memorable. After having twice reached the Arctic coast by overland routes through northern Canada, he sailed from England in 1845, with two ships and 134 men (of whom 5 turned back from Greenland) to attempt the discovery of the North-West Passage. In this he succeeded about 1847, as verified by Captain M'Clintock in 1859, but being unable to extricate his ships from the ice in which they had become fast near King William island, he and his entire crew perished in the North.

Preceding Franklin by a few years were a number of other successful Arctic explorers, including (Sir) John Ross, (Sir) W. E. Parry and (Sir) James Ross. Their several expeditions gained much geographical knowledge, and James Ross, in 1831, discovered the North Magnetic Pole.

The most intensive examinations of the northern coast of America and of adjacent Arctic islands were those made by the various Franklin search expeditions which numbered at least 35 by sea and 5 by land. Two vessels engaged in this search sailed to the Arctic by way of Bering strait, which had been explored in 1778 by Capt. Jas. Cook. One, in command of Capt. Richard Collison, got as far east as Cambridge bay on the south coast of Victoria island. The other, under Commander Robt. McClure, was abandoned off Banks island and its crew made their way over the ice to Beechey island where they were rescued, after having solved the northern North-West Passage.

THE FRANKLIN CENOTAPH AT BEECHEY ISLAND

Erected by Captain M'Clintock in 1858 in memory of the Franklin expedition that wintered there in 1845-46 and later perished in the Arctic.

Other names prominently connected with these searches include Richardson, Rae, Kellett, Inglefield and M'Clintock. The list is so long, however, that it cannot be repeated here.

A later British expedition of outstanding success was that led by Capt. George Nares in 1875-76 to the northeast extremity of Ellesmere island. Various scientific expeditions from the United States, Norway, Sweden, Denmark, Germany and other countries have also visited Canadian Arctic regions.

It remained for the late Roald Amundsen, noted Norwegian explorer, to obtain the honour of navigating the first vessel through the North-West Passage. During the years 1903-06 he traversed the maze of Canada's Arctic islands from east to west. Though the long sought passage has been discovered and traversed it is of little practical value as a commercial route because of its prevailing ice conditions.

ACQUISITION OF THE NORTHWEST TERRITORIES BY CANADA

The Northwest Territories of Canada, as a political unit, came into existence on July 15, 1870, when, by an Imperial Order in Council dated June 23, Great Britain transferred to the recently confederated Dominion her adjacent possessions in North America known as Rupert's Land and the North Western Territory, and stipulated that the combined area should be known as "The Northwest Territories". A second Imperial Order in Council of July 31, 1880, confirmed the transfer of all Great Britain's Arctic islands to the Dominion of Canada.

In 1869 an "Act for the temporary government of Rupert's Land and the North Western Territory when united with Canada" was passed by the Canadian Parliament and immediately upon the union taking place in 1870 a small portion of the newly acquired territory, including the Red River Settlement, was organized as the province of Manitoba and admitted to Confederation. The Lieutenant-Governor of Manitoba was made Lieutenant-Governor of the Northwest Territories also from year to year for a period of five years.

In 1875 the Canadian Parliament passed "The Northwest Territories Act", which provided for a more permanent form of government for the Territories. A resident Lieutenant-Governor was appointed and provision was made for a Council which should in time become a Legislative Assembly with a maximum number of 21 members. The seat of government was fixed for a time at Battleford and in 1883 changed to Regina, but the first meeting was held at Livingstone, near the present town of Swan River.

Step by step, as circumstances demanded, the further organization of the Northwest Territories was effected. The process involved the creating of various Districts and Territories, the boundaries and forms of administration of which were revised from time to time to keep abreast of development.

The District of Keewatin was created in 1876 and withdrawn from the Government of the Northwest Territories. The boundary of Manitoba was considerably enlarged in 1881. The Districts of Assiniboia, Saskatchewan, Alberta and Athabaska were created in 1882 and those of Ungava, Franklin, Mackenzie and the Yukon in 1895. The Yukon was made a separate Territory in 1898. Adjustments of the boundaries of Quebec and Ontario were made from time to time.

In 1905 the provinces of Alberta and Saskatchewan were created, their northerly boundaries being fixed as the 60th parallel of North latitude. They swallowed up the Districts of Assiniboia, Saskatchewan, Alberta and Athabaska, the only districts having representation in the Northwest Territories Legislature.

The territorial form of government in force since 1875 was, therefore, discontinued and in its place provision was made by "The Northwest Territories Amendment Act 1905", for the appointment, by the Governor in Council, of a chief executive officer to be styled and known as the Commissioner of the Northwest Territories, who should administer the government of the area that still remained outside provincial jurisdiction, under instructions from time to time given him by the Governor in Council or the Minister of the Interior. Provision was made for the appointment of a Council of four members or less, as deemed desirable, to aid the Commissioner. The seat of government was fixed at Ottawa.

On the same date in which the provinces of Alberta and Saskatchewan came into existence (September 1, 1905), the District of Keewatin was reannexed to the Northwest Territories.

Claims for a greater share of territorial lands were renewed by the older provinces of Quebec, Ontario and Manitoba and in 1912 the Dominion Government acceded to their requests. The boundaries of Quebec were enlarged to include all of Rupert's Land south of Hudson strait and Ungava bay and east of Hudson and James bays. Ontario and Manitoba

were given the remainder of these lands on the south and west shores of James and Hudson bays as far as the 60th parallel of North latitude. Thus by the year 1912, the original area of the Northwest Territories had been cut down to that of the present day.

By an Order in Council of March 16, 1918, becoming effective on January 1, 1920, the boundaries of the Districts of Mackenzie, Keewatin and Franklin were revised and defined as now existing.

PRESENT ADMINISTRATION

The first Commissioner of the Northwest Territories, named under the rearrangements of 1905, was Lieutenant-Colonel White, who was also Comptroller of the Royal North-West Mounted Police, and for several years the affairs of the Territories were practically administered by the police force. Colonel White was succeeded in 1920 by W. W. Cory, C.M.G., Deputy Minister of the Department of the Interior.

SCENE AT GOOD HOPE

Good Hope is within 10 miles of the Arctic circle. Lime is burnt in this vicinity and is used freely in whitewashing buildings.

In that year certain developments of its oil resources brought the Territories into prominence and made necessary a more active form of administration. Accordingly, as provided for by "The Northwest Territories Amendment Act of 1905," a Council of four was named early in 1921 to assist the Commissioner and a branch of the Department of the Interior was organized to carry out the active work of administration. Local offices were opened in the Mackenzie District and active steps were taken to develop the entire Territory along progressive and permanent lines.

By a further amendment to the Act of 1905, authority was created on June 4, 1921, to increase the Council to six members and to designate one member as Deputy Commissioner. This was done immediately.

The Northwest Territories Council, as at the date January 1, 1930, comprises the following members:—

NORTHWEST TERRITORIES COUNCIL

Commissioner—W. W. Cory, C.M.G., Deputy Minister, Department of Interior.

Deputy Commissioner—R. A. Gibson, Esq., Assistant Deputy Minister, Department of the Interior.

Members of Council—Charles Camsell, LL.D., Deputy Minister, Department of Mines; H. H. Rowatt, Esq., Dominion Lands Board, Department of the Interior; Colonel Cortlandt Starnes, Commissioner, Royal Canadian Mounted Police; D. C. Scott, Litt.D., Deputy Superintendent General, Department of Indian Affairs; O. S. Finnie, B.Sc., Director, North West Territories and Yukon Branch, Department of the Interior.

The administrative organization is the North West Territories and Yukon Branch of the Department of the Interior, of which O. S. Finnie is Director and Major D. L. McKeand, Assistant Director.

ADMINISTRATION OF JUSTICE

Subject to the provisions of the Northwest Territories Act which provides for the government of the Territories, the laws of England relating to civil and criminal matters as they existed on the fifteenth day of July, 1870, are in force in the Territories in so far as they are applicable or have not been repealed or modified by an Act of the Parliament of Great Britain or of the Parliament of Canada; and every Act of the Parliament of Canada except as otherwise provided is in force in the Territories in so far as it is applicable.

The Commissioner in Council is empowered to make ordinances for the administration of justice in the Territories including the constitution, organization and maintenance of territorial courts of civil jurisdiction, and for the imposition of punishment by fine, penalty or imprisonment for enforcing any territorial ordinance.

Provision is made in the Act for the appointment by the Governor in Council of stipendiary magistrates, (at the present time a judge of the Supreme Court of Alberta visits the Territories once a year on circuit).

The stipendiary magistrate may, in a summary way, try such charges as minor thefts, unlawful wounding and certain types of assault; other charges are tried with the intervention of a jury of six unless the accused elects to be tried by the stipendiary magistrate in a summary way. The Governor in Council may also appoint Justices of the Peace, each having the jurisdiction and powers of authority of two Justices of the Peace.

The Northwest Territories Act provides in considerable detail, for the administration of Justice.

The Commissioner may issue orders to the Royal Canadian Mounted Police in aid of the administration of civil and criminal justice.

For the administration of the estates of deceased persons there are two public administrators, one for the eastern portion of the Territories at Ottawa, Ontario, and one for the western portion at Edmonton, Alberta.

INHABITANTS

The present day inhabitants of the Northwest Territories comprise five fairly independent groups according to origin or occupation. These groups are: (1) Aborigines, (2) Fur Traders, (3) Missionaries, (4) Police and other Government Officials, and (5) Prospectors, white trappers and others who, for various reasons, have found themselves, for the time being, in the North.

Of these five classes the first only can be considered, as yet, permanent both as to class and individual. All the other classes represent permanent undertakings or occupations, but the people concerned are still, in most cases, transient residents. Men go North to fulfil certain missions for a term of years and then " come out ". Excepting certain missionaries, few people in any classes but the first have attached themselves permanently to these territories.

ABORIGINES

The aborigines of the Northwest Territories are certain tribes of North American Indians and a nomadic race called Eskimos that are found from the Siberian shore of Bering strait all along the Arctic coast to Labrador and Greenland. The Indians confine their settlements to the inland wooded regions, and practically to the Mackenzie watershed. The Eskimos, on the other hand, are found widely scattered along the shores of Hudson strait and Hudson bay; on the Arctic coast and on many Arctic islands.

Both the Indians and the Eskimos are said to be offshoots from the Mongolian peoples of eastern Asia. The northern Indians probably followed the Eskimos into America, but this must have happened at least 2,000 years ago—so long ago in fact that they retain no recollection of their early Asiatic home.

ESKIMO FISHING ON ARCTIC COAST

Stone traps and corrals are constructed in shallow waters to facilitate the capture of fish.

The Indians of the Northwest Territories all speak dialects of a single language, commonly called Athapascan. They are supple and inclined to slender build, having round heads and brownish skin, slightly tinged with red. Offshoots from the same people penetrated into British Columbia and down the Pacific coast into California, but the main body seems to have remained in the Mackenzie River and Yukon River valleys.

Further information, particularly respecting the locations and numbers of the various Indian tribes or nations that inhabit the Mackenzie valley and their economic situation, is given in the section on Mackenzie District under the heading *Native Population.*

For information respecting the characteristics of the Eskimos as a people the world is indebted to the ethnological studies of explorers and scientists during the last three centuries. The Eskimos are described as being of medium height and stocky build with rather fair skin. They have long heads, many of which were found to have a peculiar ridge or "keel" running from front to back. The cavity for the nose is narrower than in any other race, probably a development due to climate, since it gives greater protection against the cold.

Unlike the Indians, nearly all the Eskimos have always been Maritime people, depending for most of their food on the sea mammals. In summer they live in tents like the Indians, but in winter most of them build huts of snow. In the Mackenzie delta, where driftwood is plentiful, they build substantial houses of wood,—better dwellings than any of the northern Indians.

The Eskimos have different dispositions from the Indians, being cheerful and not morose, having more staying power and not being so easily discouraged. Further information concerning their numbers and present condition is given separately for each District in sections that follow.

The Indian population of the Northwest Territories was placed, in 1929, at 4,150 by the Department of Indian Affairs, following a census made by its officers.

Officers of the North West Territories and Yukon Branch and the Royal Canadian Mounted Police made a careful census in 1927 of the numbers and locations of all Eskimos in Canada and the results are shown in the following table: —

ESKIMO POPULATION IN CANADA, 1927

Division	Number
Baffin Island	1,513
*Hudson Bay and Strait	3,202
Central Arctic	438
Western Arctic	1,650
*Yukon Territory	300
Total	7,103

*The Eskimos on the mainland coast of the provinces of Quebec and Manitoba and in the Yukon Territory may be considered as overflows of the main body found in the Northwest Territories.

FUR TRADERS

The two great pioneer fur trading companies of Northern and Western Canada—The Hudson's Bay Company and The North-West Company—at early dates had explorers in the regions now forming the Northwest Territories. The most notable expeditions were those of Samuel Hearne and of (Sir) Alexander Mackenzie, both of which have been mentioned.

Little commercial advantage was taken of Hearne's discoveries but an immediate expansion of its fur trade into the regions explored by Mackenzie was made by the North-West Company and continued by the Hudson's Bay Company following the amalgamation of 1821.

A chain of posts at intervals of 150 or 200 miles on an average was established along the Mackenzie system of rivers and lakes, and at these posts the furs secured by the natives during a winter's season were collected and exchanged for the yearly consignment of goods carried north by the Company's own transportation system.

These posts, or so-called " Forts ", are very similar in structure. Each consists of a number of log or frame buildings, usually grouped in the form of a rectangle enclosing a small yard, which is further protected, in certain cases, by stockades to close in gaps between the buildings. As a rule the fortifications were never elaborate and are disregarded now entirely. The buildings include stores, warehouses, workshops, and homes for the resident traders. Nearly every " Fort " occupies a strategic or commanding position, having a convenient and suitable landing place for boats. Clusters of Indian cabins or wigwams surround it, giving a local colouring, while in many cases churches, mission buildings and police barracks complete the scene.

Following the lead of the Hudson's Bay Company other traders have entered the field from time to time. At present Northern Traders Limited is well established at several points in the Mackenzie District; Revillon Frères Trading Company Limited has posts in Keewatin District, and other companies and individual traders have posts widely scattered through Mackenzie District and on the Arctic coast.

Permits to operate trading posts in the Northwest Territories must be obtained from the Government. According to official records of May 1st, 1929, there were 240 authorized trading posts in these Territories at that date. Of these, 67 were operated by the Hudson's Bay Company, 29 by Northern Traders Limited, and 4 by Revillon Frères Trading Company Limited. The remaining 140 were in the hands of many small companies and individuals. Of the total number of posts the majority are very small establishments, in many cases comprising a single cabin in charge of one or two men. The largest and most complete establishments are those of the Hudson's Bay Company along the Mackenzie waterways.

MISSIONARIES

The Anglican and the Roman Catholic church organizations have from early times manifested a keen interest in the welfare of the native population of the Northwest Territories, as well as of the white traders and others who penetrate these fields. Missions have been established by either or both of these organizations at nearly all the principal settlements in the Mackenzie valley and at various places in the Hudson Bay and Arctic regions.

While these missions are primarily interested in the religious phase of the work, the intellectual and physical welfare of those to whom they minister receive all possible attention. Churches, schools—both day and boarding—hospitals, and, in the Mackenzie valley, farms and gardens as well as various forms of transport, are all important branches of the general establishments, some of which are quite extensive.

The Dominion Government grants certain financial assistance in the maintenance of these schools and hospitals and for the care of orphans and destitutes, but the whole work of the missions involves a large outlay of money and the untiring efforts of those who unselfishly devote their lives to the cause. The spread of Christianity due to these missionary efforts is reported by the authorities of the two great church bodies concerned to be making satisfactory progress. The general benefits imparted to natives and whites alike are readily appreciated by those who come in contact with the work.

MISSION BUILDINGS AT FORT SMITH

These buildings form part of the Roman Catholic Mission at this point, residence left, hospital centre, and day school right.

A listing of the various missions, by churches and native fields, is shown in the following statement:—

MISSIONS—NORTHWEST TERRITORIES

Anglican		Roman Catholic	
Indian	Eskimo	Indian	Eskimo
Fort Smith	Pangnirtung	Fort Smith	Pond Inlet
Hay River	Pond Inlet	Resolution	Eskimo Point
Simpson	Lake Harbour	Rae	Chesterfield
Norman	Southampton Island	Hay River	Baker Lake
McPherson	Fort Chimo [2]	Providence	Southampton Island
Aklavik [1]	Port Harrison [2]	Simpson	Peace Point
	Fort George [2]	Liard	Aklavik
	Eskimo Point	Wrigley	Letty Harbour
	Baker Lake	Norman	Coppermine
	Cambridge Bay	Great Bear Lake	
	Coppermine	Good Hope	
	Aklavik	Arctic Red River	
	Shingle Point [3]	Aklavik	
	Herschel Island [3]		

[1] Indian and Eskimo. [2] Quebec. [3] Yukon.

ROYAL CANADIAN MOUNTED POLICE

It seems incredible that a force of less than a hundred men of all ranks should enforce and maintain law and order in an area ten times the size of the British Isles or one-third that of the United States, yet this is what members of the Royal Canadian Mounted Police satisfactorily accomplish in the Northwest Territories. With a highly organized staff of picked men distributed in strategically located posts, this famous Canadian force not only keeps a firm grip on the situation from its own particular viewpoint but is able to lend assistance in the general development of the country.

The prevention of lawlessness or the apprehension of offenders is but a part of the multiplicity of duties performed by members of the force stationed in the Northwest Territories. They are entrusted also with the enforcement of the Northwest Game Act, the Migratory Birds Act, and other Dominion Acts. In certain instances they are called upon to assume Customs and Immigration duties; to collect income taxes; to accept applications for naturalization; to act as Postmasters, Mining Recorders or Coroners; to issue timber permits; to pay wolf and coyote bounties; to register vital statistics; to supervise liquor permits and the importation of liquor; and to issue rations to destitute Indians or Eskimos. All commissioned officers are Justices of the Peace; all ranks are Commissioners for Administering Oaths; and the duties of Sheriff of the Northwest Territories devolve upon one of the officers.

An outstanding feature of the work performed is the patrol system. At convenient times during the year—both summer and winter—members of the various detachments journey back and forth on long patrols to keep in touch with each other, to exchange mail, and to visit natives, trappers and traders along the way or in outlying sections of the country assigned

to each detachment. In this way a close touch is kept on general conditions and the natives are made to feel that the Government has an interest in their welfare.

The reports of many of these long patrols, especially those made by dog sleds during the depth of winter, involving hundreds of miles of travel across unexplored areas, make most absorbing reading and are of great value in adding to the general knowledge of the country. Further mention is made of them in the last section under *The District of Franklin.* The fact that law and order are maintained in every part of this vast northern territory is due to the established efficiency of Canada's famous mounted police body.

The strength and distribution of the force in the Northwest Territories is shown in the following statement:—

ROYAL CANADIAN MOUNTED POLICE, NORTH-WEST TERRITORIES

Detachment	Location	Number in force
Fort Smith	Slave River	10
*Stony Rapids	(Saskatchewan)	2
Resolution	Great Slave Lake	3
Reliance	"	3
Rae	"	3
Hay River	"	4
Providence	Mackenzie River	3
Simpson	"	6
Norman	"	2
Good Hope	"	4
Arctic Red River	"	2
Aklavik	Mackenzie Delta	5
*Herschel (Island)	(Yukon)	4
Baillie Island	Western Arctic Coast	2
Bernard Harbour	"	2
Cambridge Bay	Victoria Island	3
St. Roch	(Police boat)	10
Chesterfield Inlet	Hudson Bay	3
Lake Harbour	Baffin Island	2
Pangnirtung	"	2
Pond Inlet	"	3
Dundas Harbour	Devon Island	4
Bache Peninsula	Ellesmere Island	3
Port Burwell	Hudson Strait	2
Total	(Officers 5—N.C.O.'s and Constables 82)	87

*Included in N.W.T. organization.

Other Government officials stationed in the Northwest Territories include a District Agent and a small staff at Fort Smith; Indian Agents at Resolution and Simpson; medical health officers at Fort Smith, Resolution, Simpson, Aklavik and Coppermine, in Mackenzie District, and Pangnirtung on Baffin island; and wireless engineers and operators at Fort Smith, Simpson and Aklavik, in Mackenzie, and at the direction finding stations in Hudson strait and Hudson bay.

POPULATION

It is difficult to state with any degree of certainty the number of people inhabiting the Northwest Territories. The time and difficulties involved in covering these great areas make the taking of a census a difficult matter. Further, the roving nature of the natives—both Indians and Eskimos—and the transient occupations of many traders, trappers and prospectors, prevent the fixing of permanent places of residence for a large proportion of the total population.

According to government records, 546 white men secured licences to trap in the Northwest Territories during the winter of 1927-28. Included in this number were several prospectors who carry on trapping as a side-line but it is known that in addition there were other prospectors who were devoting their full time to the search for minerals. A mining population appears to be on the horizon but at present it is represented by a few year-round forerunners and a number of summer visitors.

During the summer of 1927 the Agent of the Department of the Interior stationed at Fort Smith, made a census of the white and half-breed population (over 21 years of age) of Mackenzie District. His count was 717. As children were not included their numbers must be estimated. It might be fairly safe to assume that there were about half as many minors as adults. On this basis the white and half-breed population of Mackenzie District, as in 1927, was a little over 1,000 and this figure might be taken as a rough approximation.

Officers of the North West Territories and Yukon Branch estimate that the present white population of the Eastern Arctic is about 40 and of the Hudson Bay area of the Northwest Territories, about 25—or 65 in all. Adding these figures to those of Mackenzie district makes a total of 1,065 as representing the white and half-breed population of the whole Northwest Territories.

A summing up of the counts obtained for all classes of people shows a total population of 12,318 made up as shown in the following statement:—

TOTAL POPULATION, NORTHWEST TERRITORIES

(From most recent census and estimates)

Race	Number
Whites and Half-breeds	1,065
Indians	4,150
*Eskimos	7,103
Total	12,318

*Including all Canadian Eskimos.

The organization of the Northwest Territories having reached that stage where it was deemed practical to obtain official records of the vital statistics of all its population, both white and native, steps were taken on

June 23, 1926, to do so. Under the provisions of *The Vital Statistics Ordinance* of that date, which became effective on January 1, 1927, arrangements were made for the official recording of all births, marriages and deaths among whites, half-breeds, Indians and Eskimos. It is hoped that the result of a few years' records will make possible an approximate determination of the rate of increase or decrease of the native Indian and Eskimo population.

The summarized returns for the first year in which this new ordinance has been in force are shown in the following statement. Until returns for several years have been secured they are, of course, of more interest than value.

VITAL STATISTICS, NORTHWEST TERRITORIES, 1927

District	Births	Marriages	Deaths
Mackenzie	67	8	84
Keewatin	5	5	0
Franklin	40	7	24
Total	112	20	108

WILD LIFE

To the aborigines of the Northwest Territories the wild life resources were all-important. The Indian depended almost entirely on them for food, clothing and shelter, though his food supply was augmented by berries and certain edible plants and fruits, and the forest supplied his fuel and wood for the manufacture of various essential articles of daily use, such as canoes and dog sleighs.

The Eskimo derived practically all the necessities of life from the sea mammals and fish found along the Arctic coast and the animals and birds that migrated thereto yearly. To him they were the source of food, clothing, shelter, fuel and necessary articles of daily use. The seal and the caribou were his chief mainstays, and the ivory obtained from the walrus and narwhal was the source of many ingeniously constructed tools and articles of every-day use.

As no general description of the Northwest Territories can be complete without reference to its forests and vegetation, so no description of its natives can convey an intelligent picture without some reference to the wild life resources. Of all the natural resources with which these Territories may be endowed, the wild life alone has played any great part in the economic welfare of the native people.

The expression "wild life" is used here in its broad sense and is intended to include all forms of lesser life found in the Northwest Territories. While it is not attempted to set forth a complete biological list, which would be entirely beyond the scope of this work, the principal species of wild animals, aquatic mammals, fish and birds are mentioned, with special reference to those of economic value.

BIG GAME

Of the order, *Ungulata,* or hoofed animals, which includes the most important of the big game animals, there are seven most interesting species, two of which are practically restricted, in their habitat, to Arctic and sub-Arctic regions. These seven are—American bison, those found in the Northwest Territories being commonly referred to as wood buffalo; moose; woodland caribou; barren-ground caribou; Rocky Mountain goat; Dall's mountain sheep; and that rare and distinctive northern animal, the musk-ox.

The American bison, more commonly known as the buffalo, is found in a free state in the southern part of Mackenzie District. These animals are remnant herds of the millions that once roamed over the western prairies. A more complete record of their numbers and habitat will be found under the heading *Wood Buffalo Park* in the section on Mackenzie District.

AMERICAN BISON IN WOOD BUFFALO PARK

Remnant herds of American bison still roam in a free state in the southern part of Mackenzie District. They are popularly known as wood buffalo and their range has been set aside as a game sanctuary known as Wood Buffalo Park.

Moose are found scattered throughout nearly all the wooded areas of the Mackenzie valley, their range extending as far north as the Mackenzie delta. They are comparatively scarce, but according to hunters, some are of large size.

Woodland caribou are occasionally found in the southerly and westerly parts of the mainland. Their numbers are believed to be comparatively few.

The barren-ground caribou, which is smaller than the woodland species, is the most numerous of big game animals in the Northwest Territories. It has a very wide range extending over most of the mainland east of Mackenzie river and on nearly all of the Arctic islands. A further description is given in the section on Mackenzie District under the heading *Barren-Ground Caribou.*

A few Rocky Mountain goats are believed to range on the eastern slope of the Rocky mountains in the southern part of Mackenzie District but no recent report has been received.

Dall's mountain sheep are found on the east slope of the Rocky mountains, nearly as far north as the Arctic coast. Many specimens have been secured by Indians and others on the Peel, Gravel and Nahanni rivers. In 1928, Mr. Fenley Hunter, of Long Island, N.Y., secured four for scientific purposes on the South Nahanni river.

The musk-ox, a distinctive Arctic animal, now unfortunately very rare, is found on the mainland in a few localities difficult of access, and on several of the Arctic islands. A fuller description of the animal is given under the heading *Thelon Game Sanctuary and The Musk-Ox* in the Mackenzie section.

Four species of bears and two of wolves are found also. They are included with the fur bearers.

FUR BEARERS

The fur-bearing animals of the Northwest Territories constitute one of its major assets and the only resource that has been commercially exploited to any extent. The principal fur bearers are those belonging to the order of carnivorous or flesh-eating animals, but two very valuable rodents are included—the beaver and the muskrat. The number of muskrat pelts traded in a single year recently was more than double that of all other pelts combined.

The largest fur-bearing animals are the bears, of which there are four species—polar, grizzly, barren-ground and black. Polar bears (white) are found along the Arctic coasts, in Hudson bay, on the northern islands and on ice floes, from where they prey on the walrus, seal, and other aquatic life. The grizzly bear is found in the Rocky mountains and seldom to the east of the Mackenzie river. Richardson's barren-ground bear is still but little known, though a few skins are exported by the traders. Its range is from the edge of the treeless areas to the Arctic coast in Mackenzie District. Black bears are common in wooded areas.

Wolves are fairly common and widespread, both in timbered and treeless areas. Biologists report two species—the northern timber wolf in the more southerly and wooded areas, and the Arctic wolf in the treeless areas. Though different in colour, the gray and black wolves are of the same species. Traders report a blue wolf which is probably a variant of the grey. The prairie wolf, or coyote, is found in the southern parts of Mackenzie District, 376 skins having been included in the trade returns for a recent year. The wolverine is fairly widespread, both in timbered and treeless areas of the mainland and on some of the Arctic islands, and the Canada lynx in the timbered areas, spreading out to bordering regions.

Foxes account for a large share of the fur trade of the Northwest Territories. The Canadian Arctic regions produce great numbers of white skins and a few blue ones. In timbered parts are found red, cross and silver foxes. The ermine or weasel is plentiful also as far north as trappers are operating. The skunk is rare but it has been found as far north as the south shore of Great Slave lake.

Otter, beaver, marten and mink, of exceptional quality and beauty, are secured throughout practically the whole of the timbered parts of Mackenzie District and in parts of Keewatin, and fisher in southern Mackenzie. Of these the marten and mink are most plentiful. Otter is somewhat rare

and fisher more so. Restrictions on the taking of beaver have been made more rigid as this animal was beginning to show signs of decreasing in numbers. In addition to these more valuable furs must be added the muskrat, now quite highly prized also. Trade returns for a recent year included over 150,000 of these pelts.

Returns made under the Northwest Game Act for the year 1927-28 give the value of furs traded during that year as approximately two million dollars. Particulars as to species and numbers, by Districts, are shown in the following statement.

STATEMENT OF FUR-BEARING ANIMALS TRADED UNDER NORTHWEST GAME LICENCES DURING THE LICENCE YEAR 1927-28

Class	Districts			N.W.T.
Fur bearers	Mackenzie	Keewatin	Franklin	Total
Bear, black	210	–	1	211
" grizzly	1	–	–	1
" not specified	21	–	–	21
" white	261	–	123	384
Beaver	7,287	–	–	7,287
Coyote	376	–	1	377
Ermine	8,289	21	225	8,535
Fisher	72	–	–	72
Fox, blue	56	26	133	215
" cross	1,039	9	11	1,059
" not specified	13	–	–	13
" red	2,389	16	24	2,429
" silver	139	–	–	139
" white	11,221	5,831	4,089	21,141
Lynx	2,621	–	–	2,621
Marten	7,732	11	–	7,743
Mink	3,586	44	–	3,630
Muskrat	154,490	158	–	154,648
Otter	222	6	–	228
Skunk	35	–	–	35
*Wolf	151	100	128	379
Wolverine	222	43	7	272

*In addition to the 379 wolves shown in the licence records as having been traded, the pelts of 1,040 wolves, which had been killed in the Northwest Territories, were surrendered for bounty.

Besides the beaver and the muskrat there are several species of rodents found throughout the Northwest Territories, the flesh of some being utilized as food and the fur, to a certain extent, in the making of robes, by the natives. In these connections the hares, which are very plentiful in cycles of a few years, play an important part. The rodents furnish also the basis of food supply for many of the larger and more valuable fur bearers.

Several species of mice and lemmings are widely distributed. The common red squirrel is found in nearly all wooded regions and a few flying squirrels have been observed in the Mackenzie valley. The northern chipmunk is fairly common and the bushy-tailed wood rat is found in the

JOHN FIRTH, VETERAN FUR TRADER.

John Firth, shown above with his wife and grandchild, went to McPherson in the employ of the Hudson's Bay company in 1874 and has made it his home for over 55 years.

Liard valley. Gophers or ground squirrels and a few Canadian woodchucks or ground-hogs are found in the Mackenzie valley. The hoary marmot or large woodchuck inhabits the mountains west of the Mackenzie river. Porcupines are found here and there in the wooded areas. Of the hares, there are many subspecies widely scattered over the mainland and most of the Arctic islands and the islands of Hudson bay.

Several species of shrews have been found in the Mackenzie valley and as far north as the Arctic coast. It has been recorded also that an occasional bat has been seen at Great Slave lake.

AQUATIC MAMMALS

Whales were at one time plentiful in both Eastern and Western Arctic waters, as well as in Hudson bay, and whaling was for many years an important industry in these regions. There were three principal headquarters or places of rendezvous where whaling vessels wintered in readiness for a season's operations. These were Blacklead island in Cumberland sound on the east coast of Baffin island; Whale point near Chesterfield inlet on the west coast of Hudson bay; and Herschel island, Yukon, near the mouth of the Mackenzie river. The industry reached its zenith between the years 1850 and 1900, after which it rapidly declined owing to the almost complete disappearance of the more valuable species of whales, the Greenland or right whale or Bowhead on the eastern coast particularly. No whaling is now being carried on in Eastern Arctic waters or in Hudson bay, and very little is prosecuted with Herschel island as a base. Operations from the two eastern bases were formerly conducted almost exclusively by Scottish whalers from Dundee, and from Herschel island by United States vessels.

The right whale is now seldom seen in either Eastern or Western Arctic waters or in Hudson bay. According to Major L. T. Burwash, Exploratory Engineer of the North West Territories and Yukon Branch, the most common species of whales or dolphins now found in Canadian Arctic waters are the narwhal and the white whale or *beluga*. Other species found in Canadian Arctic regions include the finback, the sulphur-bottom, the humpback, the harbour porpoise, and the killer.

Several species of seals are widely distributed, and with the walrus, the narwhal and the white whale form the staple diet of the Eskimos who now depend more on sea mammals for food than on the caribou which are uncertain in movement and difficult to capture. The walrus and narwhal are confined to Eastern Arctic waters. Burwash mentions the following species of seals—the jar or ringed seal, the square-flipper or bearded seal, the harp or Greenland seal, the fresh-water or harbour seal and the hooded seal. The ringed seal is fortunately plentiful as it provides the choicest meat and light skins for clothing as well as a better grade of oil. The bearded seal provides cordage and heavy leather for boots and kayaks and is fairly plentiful also. The other species are reported scarcer in Canadian waters.

The walrus was formerly much in demand by the Eskimos for its tusks, from which many of their necessary tools were made. Now that better tools can be secured from the traders this necessity no longer exists but the ivory still forms an item of barter.

It is interesting to note that the mollusks and articulate forms of marine life, such as mussels, clams, shrimps, sea crabs and others, are widely distributed and plentiful in the cold water of these regions. Since they form an important item in the diet of the sea mammals their presence is very important. They are also eaten by the natives. Various forms of seaweed and dulse are made use of for the same purpose.

From the sea mammals of Arctic waters the native Eskimo can obtain food for himself and his dogs, clothing, shelter, oil for heating, cooking and illuminating, weapons, tools, dog harness, and, in short, every necessity of existence should the products of the land fail him. It is for this reason that the Government has taken means to reduce the slaughter of these mammals.

FISH

The inland waters of Mackenzie and Keewatin are well stocked with several species of valuable fresh-water fish and a few of poorer quality. Comparatively little is known of the fish resource of adjacent salt waters though Burwash expresses the opinion that they are not plentiful on the Arctic coast, and though adding to the Eskimos' food supply might be quickly depleted by commercial operations. He states that cod are found in at least one area off Baffin island.

In the great lakes and rivers of Mackenzie District the principal species are the whitefish, lake trout and inconnu. Tullibee, pike and suckers are plentiful also, though not so highly prized for food. Pike, or jackfish, and goldeyes are found as far north as Great Slave lake. Species of herring, whitefish and smelts are reported from the lower river and Great Bear lake. Some sculpin and loche have been taken. The sculpin are not held in any value but the loche are highly prized by the natives. The lake trout and

inconnu attain a good size and with the whitefish are used extensively for human consumption, while great quantities of the coarser species are used as dog feed. The Arctic grayling is found in nearly all clear streams.

The fish resources of Hudson bay and adjacent salt waters are not yet well known. True cod are found in Ungava bay, and rock or Greenland cod have been taken along the east coast of Hudson and James bays and on the south coast of Baffin island. Capelin are plentiful in both bays as well as the so-called lake herring or lesser whitefish. Salmon-trout are found in the northern part of Hudson bay and in the lower parts of the rivers emptying into it, which they ascend during the spawning season. The sculpin and whitefish are found also.

Some of the fresh-water lakes of the Arctic islands are known to contain fish. Dr. L. D. Livingstone, Chief Medical Health Officer for the North West Territories and Yukon Branch, who crossed Baffin island during the early months of 1927, reported lake trout in inland waters encountered. Police and other Arctic travellers have made similar reports. J. Dewey Soper reports that the Arctic char is found in Nettilling lake and along the south coast of Baffin island.

BIRDS

The principal game birds of the Northwest Territories are the grouse, permanent residents; and several species of geese and ducks, migratory visitors.

The spruce grouse is widely distributed in all wooded areas, and the ruffed grouse or partridge has been found as far north as the Mackenzie delta. The sharp tailed grouse, or pin tail chicken, is found in the southern parts of Mackenzie District. Willow and rock ptarmigan are native to nearly all parts of the mainland of northern Canada and to many of the Arctic islands.

The Canada goose is the best known and most highly valued of the several species of wild geese that breed in the Northwest Territories. It nests as far north as Great Bear lake. The snow goose nests in large numbers on western Baffin island. The brant is found over wide areas as far north as Ellesmere island. It is interesting to note that the nesting ground of the blue goose, for so long unknown, was discovered in 1929 by J. Dewey Soper, Biologist to the North West Territories and Yukon Branch. It is located on the west coast of Baffin island near Bowman bay.

Of the wild ducks that migrate to the Northwest Territories in large numbers for the summer months, the mallard is most sought by sportsmen. In the report of his biological investigation of the Athabaska-Mackenzie region, E. A. Preble of the American Biological Survey, mentioned 12 species of geese and 32 of ducks.

Large numbers of water birds frequent the Arctic coasts during the summer months but only one, the guillemot, is said to remain all winter. The murre, dovekie, jaeger, gull, tern, fulmar, grebe and loon, are numerous visitors; the cormorant is rare, and the pelican nests as far north as the lower rapids on Slave river at Fort Smith.

There are many shore birds and waders including the bittern, heron, crane, rail, coot, snipe, sandpiper, and plover. Eiders are widely distributed on Hudson bay and the Arctic shores and include three species—the northern, Pacific and king.

Hawks, owls, eagles, ravens and crows are quite common and widely distributed.

PACIFIC EIDER ON NEST

Pacific eiders nest in great numbers along the Arctic coast of Mackenzie District. King eiders are widely distributed and Northern or Greenland eiders nest on Eastern Arctic and Hudson bay shores.

Nearly all species of well-known insectivorous birds common to the western Canadian prairies find their way into the Northwest Territories during the summer months, especially into the Mackenzie valley. Preble's list of birds found in these regions contains 100 species in all, including many of the popular Canadian songsters. Among these are the robin, bluebird, thrush, chickadee, wren, warbler, swallow, martin, tanager, tomtit, meadowlark, redwing and phoebe.

The friendly Canada jay, popularly known as the "camp robber'" or "whiskey-jack", is found in all wooded parts and soon makes his presence known to camping travellers. The snowflake or snowbird is found in nearly every part of the Territories in large flocks and is a permanent resident. Its habitat, like that of several other northern species, is circumpolar.

GAME PRESERVES

In the interests of wild life and the welfare of the native population, the areas known as the Slave River, Yellowknife, Peel River and Arctic Islands preserves have been reserved as exclusive hunting grounds for the native Indians, Eskimos and half-breeds. The total area of these preserves is 518,550 square miles.

The establishment of trading posts within the preserves is restricted under the Game Regulations to such locations as shall be determined from time to time by the Minister. Traders are permitted to establish posts only at such points as are necessary in the interests of the native population. This policy prevents exploitation of the fur resources of those areas and insures for the natives a continual supply of fur.

It is reported that the different forms of wild life in the preserves are increasing in number, and it is hoped game will increase and overflow to such an extent that the more heavily trapped districts adjacent to them will be restocked.

ACCESSIBILITY AND TRANSPORTATION

The Northwest Territories are becoming, year by year, more readily and easily accessible as modern methods of transportation tend to minimize such obstacles as time and distance. Rail-heads are creeping nearer their borders and vessels are navigating their waters with greater confidence. From numerous bases aeroplanes fly back and forth across unexplored areas and cover in a brief space of time large tracts of territory that were practically inaccessible a few years ago.

Routes to the Northwest Territories might be divided broadly into two classes, those by sea and those by land or interior waterways. As the transportation facilities of each of the three Districts of Mackenzie, Keewatin and Franklin are given separately in greater detail in sections that follow, an outline only of the subject will be given here with special reference to the accessibility of, or the approaches to, the Territories as a whole.

ROUTES BY THE SEA

There are two widely separated sea routes to the Northwest Territories. The Eastern Arctic and Hudson Bay regions are approached by vessels that navigate the Atlantic ocean and the Western Arctic regions by vessels hailing from the Pacific ocean.

Atlantic-going vessels, on approaching the Eastern Arctic, have a choice of two diverging routes. Those bound for ports on the east coast of Baffin island or on Ellesmere or other northern Canadian islands as well as ports on the opposite shores of Greenland, follow a northerly course through Davis strait and into Baffin bay. Those sailing for points on the shores of Hudson bay must turn aside and navigate the 500 miles of Hudson strait before reaching the bay.

In the early days nearly all trading in Hudson bay was done by vessels sailing directly from and returning to England. Now the bases for the

majority of expeditions to the Hudson Bay and Eastern Arctic regions are the Canadian ports of Halifax, Saint John, Sydney, Quebec and Montreal.

The Western Arctic has been served for many years by ocean-going vessels sailing from Vancouver, Victoria or other Pacific ports, through Bering sea and Bering strait and into Beaufort sea. Herschel island, off the Yukon coast, is the principal rendezvous for these boats. During the heyday of whaling activities many whaling ships wintered at this island and from it the distribution of goods and the collection of furs along the coast and the hunting of whales were prosecuted as ice and other conditions permitted.

During recent years the Hudsn's Bay Company, in order to better serve its chain of posts that has been gradually pushed eastwards along the Arctic coast, has sent its supply ship as far as Cambridge Bay. This post should prove a much more central distribution point than Herschel island if it can be safely reached each year and it would now appear that this is possible. The same company despatched one of its trading schooners, the *Fort James,* to this vicinity by the Atlantic route. This vessel actually succeeded in making the North-West Passage and safely reached Peterson bay on King William island. It was thus the first commercial vessel to make the North-West Passage but the time required has proved that the route is not feasible commercially.

There are no regular sailings to the Northwest Territories, either by the Atlantic or the Pacific route. Many vessels have followed both routes but each on its own particular errand. For many years explorers and whalers accounted for the majority of voyages. During recent years vessels in the government service or in the fur trade represent the principal traffic to these regions.

THE HUDSON BAY ROUTE

The development of a route from the western interior of Canada to the high seas by way of Hudson bay and Hudson strait is now approaching the final stages. Though it concerns particularly that part of Canada lying south of the Northwest Territories, its successful completion cannot fail to exert a great influence on the development of the latter, especially on that of Keewatin District. Churchill, the meeting point of proposed rail and steamer routes, is situated on the west coast of Hudson bay about a hundred miles south of the Manitoba-Keewatin boundary, so that any development of a route through it will be reflected on Chesterfield and other comparatively close harbours of Keewatin mainland and the islands of Hudson bay.

The most serious obstacle to the navigation of the Hudson Bay route is undoubtedly the ice condition that prevails for several months of each year in Hudson strait. The bay itself is open the year around except for shore ice which forms for several miles out to sea and for floe ice which occasionally drifts in from the strait or originates from the breaking up of the shore ice. Though Churchill harbour freezes over during the winter months, the length of its shipping season could be extended by the use of icebreakers.

A preliminary study of ice conditions in general and of the extent to which aids to navigation might be advantageously employed in Hudson strait was completed recently by the Dominion Government. Three bases were established from which frequent air patrols were made over the water or ice. These bases were located at Port Burwell, Wakeham bay and Nottingham island.

The results of this study demonstrated the value and practicability of a chain of radio-equipped stations along Hudson strait as aids to navigation therein. Permanent stations were established, in the light of such information, at Churchill, Nottingham island, cape Hopes Advance, and Resolution island.

The work of erecting these stations was in the hands of the Radio Branch of the Department of Marine and Fisheries, and that service will carry on their subsequent operation. The use of radio direction-finding equipment will enable ships equipped with radio to navigate the strait in all kinds of weather. This chain of stations will be able to communicate with the station at Belle isle, which is the easterly terminus of the Gulf of St. Lawrence chain, while Churchill is connected with the landline system, thus forming a complete loop of radio communication around Hudson bay and strait. Short wave equipment for communication with Ottawa has been installed in the stations at Churchill and cape Hopes Advance.

INTERIOR ROUTES

There is more traffic to and from Mackenzie District than to or from Keewatin and Franklin combined and the greater part of the traffic is by an inland rail-and-water route, of which the city of Edmonton, Alberta, might be said to be the southern terminus. Particulars of this route are given in the section on *Transportation and Communications* for Mackenzie District.

RAMPARTS OF MACKENZIE RIVER

The Mackenzie ramparts occur near Good Hope. For about 7 miles the banks of the river consist of vertical cliffs of limestone 150 feet in height.

In the development of the northern part of the Great Plains of Western Canada it is not unreasonable to expect that the steady northward progress of railway construction will carry the end of steel, within a few years, from Alberta to some point or points well within Mackenzie District. This route, when more fully developed, is likely to control all traffic to and from Mackenzie District and the Western Arctic.

When the Hudson Bay division of the Canadian National Railways is opened to general traffic, an almost immediate event, Churchill, on the west coast of Hudson bay, will be within three days run of Winnipeg. From Churchill it will be possible to reach Chesterfield by coastal schooner in a couple of days so that the heart of Keewatin District will be fairly readily accessible from interior Canadian cities.

Between the lower part of James bay and points on railways in northern Ontario and Northern Quebec there is a restricted amount of travel by canoe in summer months and dog sleigh in winter months. The northward progress of the Temiskaming and Northern Ontario Railway suggests that rail and ocean transport will eventually meet at the foot of the bay.

READJUSTMENTS IN TRANSPORTATION SERVICES

The extension of the fur trade along the Arctic coast and the possibility of mineral development in these areas has stressed the necessity for better and more direct transportation facilities thereto. A water route from the Atlantic to central or western Arctic regions has been proved impracticable. The route from Pacific ports by way of Bering strait is long, uncertain and costly. If the gaps between the Arctic coast and the most advanced depots on the Mackenzie river and the west coast of Hudson bay could be bridged, the long round-about routes now in use could be abandoned.

With this objective in view the Hudson's Bay Company has been seeking a point in the Mackenzie delta where river and coastal boats might meet. Anticipating the successful location of a common port the company is preparing to establish a much more elaborate system of transportation on the Mackenzie route and to remove its present northern terminus of Aklavik to the new location. At the same time Herschel island would be abandoned in favour of this location, the Bering Strait service would be discontinued and a boat for service along the Arctic coast would be kept permanently in the North.

A site on Cockburn bay near the mouth of Back river on the north mainland coast of Keewatin District and almost due south of Peterson bay on King William island, was selected by the company for the establishment of a second or auxiliary Arctic depot. Experiments in the use of tractors between this site and Wager bay were made. The transporting of supplies to Wager bay will be simplified by the inauguration of the Hudson Bay route when they can be sent to Churchill by sea or rail and forwarded by coastal boat. From Wager bay to Cockburn bay involves an overland haul of less than 150 miles.

It was found that the transportation of freight by tractor on this overland section was quite practicable but rather costly. A warehouse was built at Cockburn bay and a small supply of coal and gasolene was stored in

it. For the meantime this tractor service will not be brought into general use but the warehouse at Cockburn bay will be maintained as a standby or emergency depot until final plans have been worked out.

With two transfer depots as suggested and a couple of coastal boats operating between them during summer months, the transportation requirements of the mainland of northern Canada from Boothia peninsula to Alaska, and of adjacent islands, would be met to a degree sufficient for many years to come.

AERIAL TRANSPORTATION

The successful introduction of the aeroplane for commercial and practical purposes has done more to make possible and to hasten the development of the Northwest Territories than any other single accomplishment. This is particularly true with respect to aerial prospecting for minerals.

The practicability of aerial prospecting was demonstrated to business men in connection with the examination of the Red Lake and other areas in northern Ontario. In the light of these successes the wider and more distant fields of the Northwest Territories were entered with the fullest confidence, and the results have justified the faith of those responsible.

The idea of conquering the North through the medium of the air is no recent one. Polar explorations by air preceded aerial prospecting, and lighter-than-air craft were tried out in advance of heavier-than-air machines. The intrepid Major Andrée led the way on his ill-fated balloon expedition; Amundsen successfully navigated the North polar regions by dirigible; and the Imperial Oil Company introduced aeroplanes into northern Canada in a commercial way by transporting a number of officials between Edmonton and the oil well at Norman in 1921.

Aerial prospecting has been carried out more recently on extensive scales by Northern Aerial Minerals Exploration Limited, and Dominion Explorers Limited, and in more restricted areas by the Consolidated Mining and Smelting Company. Other prospecting companies have made use of planes operated by commercial flying organizations. Western Canada Airways Limited has done a great amount of commercial flying in the North, particularly in Mackenzie District, and Commercial Airways Limited secured the contract for the carrying of mails as far north as the Mackenzie delta during the winter of 1929-30.

In the Northwest Territories, Northern Aerial Minerals Exploration Limited has main depots at Baker Lake, Fort Reliance and Landing lake, and supply depots and flying bases at cape Eskimo, Wager bay, Repulse bay, Resolution, Rae, Simpson, Nahanni, Norman and Confidence, as well as adjacent stations in the northern parts of the Prairie Provinces and a chain around Hudson and James bays. Dominion Explorers Limited has main bases at Tavane (Mistake bay), Baker Lake, Bathurst inlet, Fort Reliance and Stony Rapids (Saskatchewan), food and gas caches at Wager bay, and Coppermine, as well as extra gas caches at various places in the Territories.

Two factors combine to make the possible mineral fields of the Northwest Territories nearly inaccessible by the ordinary methods of travel, namely, the great distances involved and the shortness of the season for

travel. It is practically impossible, by any other way than aerial prospecting, to expeditiously examine remote areas. During the short time in which aeroplanes have been used for this purpose, nearly all parts of Mackenzie District and the mainland of Keewatin District have been given preliminary examinations.

TYPE OF AIRCRAFT USED IN NORTHWEST TERRITORIES

Aerial transportation and aerial prospecting are recent developments of great economic importance in the Northwest Territories.

The advantages of aerial transportation are particularly important in the North. The contrast between the time involved in any other available means of travel and that by air are more pronounced than in countries having railways and motor roads. In carrying personnel and mail the difference is sometimes as much as hours are to months, and commonly as hours to weeks. One cannot but think how quickly the Franklin expedition might have been relieved had these present-day conditions existed at that time.

Considerable attention is being given to the possible establishment of an air service between North America and Europe that will follow a northerly route. If such proposals mature, the Northwest Territories will lie in its direct path and intermediate stations may be established on the shores of Baffin island or other Arctic lands that for so long have been isolated.

THE DISTRICT OF MACKENZIE

GEOGRAPHICAL FEATURES

MACKENZIE District derives its name from its great waterway, the Mackenzie river, so named in honour of its discoverer, (Sir) Alexander Mackenzie. Its area (527,490 square miles) is greater than that of any province of Canada except Quebec. Of the three Districts comprising the Northwest Territories, the Mackenzie has been the scene of the greatest development undertakings.

MACKENZIE RIVER SYSTEM

The Mackenzie River system is the largest in Canada and the second largest in North America, being exceeded by the Mississippi only. It embraces an area of 682,000 square miles, including the whole of northern Alberta, the northeast part of British Columbia, the northwest corner of Saskatchewan and parts of the Yukon Territory, as well as the heart of Mackenzie District itself.

The principal sources of the Mackenzie are the Peace and the Athabaska rivers. The Peace itself is formed by the junction of the Finlay and the Parsnip in the northern interior of British Columbia. The Athabaska débouches into lake Athabaska and the river flowing from this lake, in reality a continuation of the Athabaska, is known as the Rocher. The Peace joins the Rocher a few miles below Athabaska lake and the combined waters form the Slave river.

A series of rapids occur on the Slave and cause an interruption to navigation on these northern waters. A 16-mile road leads from the head of these rapids at Fitzgerald to their foot at Fort Smith, which is located just within the border of the Northwest Territories. This interruption, right at the boundary line, makes of Fort Smith a natural gateway to the Mackenzie District and a southern terminus for boats operating therein.

From Fort Smith the Slave flows northerly a further distance of nearly 200 miles to Great Slave lake. This lake is a huge reservoir on the Mackenzie system, nearly 10,000 square miles in extent. The Slave is its principal feeder but there are several other large ones. The Taltson and the Snowdrift flow into it from the southeast. The Lockhart enters its eastern arm, draining the Artillery, Clinton-Colden and Aylmer chain of lakes. On the north, the Yellowknife and Marian rivers are tributary, while on the south, and at points west of the mouth of the Slave, the Little Buffalo, Buffalo and Hay rivers enter.

The Mackenzie river proper is that part of the whole waterway flowing from the outlet of Great Slave lake to the Arctic coast, a distance of over 1,000 miles. It is a majestic river, having an average width of over a mile and a strong steady current. The length of the whole waterway, from the head of the Finlay to the mouth of the Mackenzie, is about 2,525 miles.

Below Great Slave lake, the principal tributary of the Mackenzie is the Liard, which joins it at Simpson. The lower Liard is navigable for many miles but, like the Peace, it flows through the mountains and has many very turbulent sections therein. The South Nahanni, one of its tributaries wholly within Mackenzie District, was the scene of special interest in 1928 when it was visited by aerial prospecting parties of the Northern Aerial Minerals Exploration Limited, seeking placer gold on one of its branches, Flat creek. Another party, headed by Fenley Hunter of Long Island, N.Y., ascended it by canoe a distance of 122 miles and explored a waterfall that had been reported by Indians. Measurements and photographs were secured and the falls, which are reported to be very beautiful, were found to be about 316 feet in height.

Other large tributaries of the Mackenzie are the North Nahanni, the Gravel, the Bear, the Hare Indian, the Thunder, and the Peel rivers. Bear river is about 75 miles in length and drains Great Bear lake, which is approximatly 12,000 square miles in extent. The Peel is a large river draining northern tracts of the Yukon and, while perhaps not to be regarded strictly as a tributary of the Mackenzie, shares with it a common delta.

The principal features of the lower Mackenzie are the Sans Sault rapids, the ramparts and the delta. The rapids occur between Norman and Good Hope and are formed by a rocky ledge running out from the right bank almost across the river. During high-water stages the rapids are not troublesome to navigation but when the water is low they present considerable difficulties. The ramparts commence about 9 miles above Good Hope and consist of vertical walls of limestone about 150 feet in height through which the river flows in a contracted channel for a distance of about 7 miles. The delta of the Mackenzie and Peel rivers is over 100 miles in length and 50 in breadth and consists of low alluvial flats through which these rivers have cut numerous channels and cross channels. The general level of the land is but a few feet above high-water mark, the forests gradually disappear about half-way to the sea and thick growths of willows abound. Owing to ice and other local conditions the various channels are continually shifting and changing and great quantities of silt are being carried down and deposited at the several outlets.

OTHER FEATURES

The Mackenzie delta lies at the westerly extremity of the Arctic coast line of Mackenzie District. Flowing into the sea at more easterly points are the Anderson and the Coppermine rivers. The mouth of the Anderson is in Liverpool bay and that of the Coppermine in Coronation gulf. Bathurst inlet, off the east end of Coronation gulf, receives the waters of Hood, Burnside and other rivers, and Ellice and Perry rivers flow into Queen Maud gulf farther east.

Dubawnt river is found in the southeasterly part of Mackenzie District, flowing into Dubawnt lake, which lies on the boundary between Mackenzie and Keewatin Districts, and thence into Beverly lake. Thelon river and its principal tributary, Hanbury river, and Back river, all have their sources in the interior lakes of Mackenzie District that lie to the northeast of Great Slave lake. The Thelon flows easterly to Beverly lake in

Keewatin District and thence to Chesterfield inlet. Back river, after an erratic course, finally reaches the Arctic coast at Cockburn bay, Keewatin District.

To the west of, and paralleling the general direction of the Mackenzie river, are the Mackenzie and Richardson mountains, which belong to the Rocky Mountain system. Spurs or off-shoots of this system and known as the Horn and Franklin mountains rise to the east of the river between Providence and Good Hope. One of the most picturesque features of these mountains is Bear rock at the mouth of Bear river. Aside from these elevations the central part of the District is of comparatively low relief, and gradually merges into the "lowlands" of the Mackenzie delta.

The south central part of the District, surrounding the easterly arm of Great Slave lake, is on the border of the Laurentian plateau and is very rugged and abrupt. The general elevation is about 700 feet above the lake and great escarpments and masses of irregular rocks are everywhere exposed. The rivers falling into this part of the lake are very precipitous and offer numerous sites for water-power development. They are, consequently, difficult to navigate and numerous portages confront the traveller who seeks to follow them.

North and east of this rugged belt are the Northern Plains. The high plateau slopes gently to the Arctic and somewhat more abruptly towards Hudson bay.

While the general elevation is comparatively uniform, the surface is broken by a succession of low hills and wide valleys. There is a fairly liberal overburden of soil, interrupted by irregular outcrops of rocks and deposits of morainic boulders. The forests give way to low bushes, shrubbery, grasses, mosses, lichens and flowers.

The outlines of both Great Bear and Great Slave lakes are very irregular, forming long arms and deep bays. The north and east arms of Great Slave lake contain many rocky islands.

THE FUR TRADE AND ALLIED RESOURCES

The aggressive policy of the North-West Company, the Canadian rival of the Hudson's Bay Company in the fur trade of the Northwest Territories, doubtless had considerable influence in prompting Mackenzie's bold voyage of 1789 on which he discovered and explored to its mouth the great Mackenzie river. Himself a partner in this active Company and having charge of its western trade with headquarters at Chipewyan, on lake Athabaska, he lost no time in taking full commercial advantage of his discoveries by extending his chain of posts into the new-found fields.

The Hudson's Bay Company, as reorganized following its union with the North-West Company in 1821, thus became possessor of a well-established fur trade in Mackenzie District and this trade was vigorously pushed into more distant fields. The Yukon Territory was tapped by two long and difficult routes, one by way of the Liard river and the other far north of the Arctic circle by way of the Rat and Porcupine rivers. Trading vessels were sent to the Arctic coast by way of the Pacific ocean and Bering strait and a depot was established at Herschel island.

As previously mentioned, the fur trade thus established has flourished for a century and a quarter and is still the principal commercial activity of Mackenzie District. The Yukon, now being more accessible from other points, is no longer associated with Mackenzie District in this trade, but during comparatively recent years the coastal region has been entered by the trader, as well as many strategically located areas in the interior of the District.

PRINCIPAL TRADING POSTS

The principal trading posts and the settlements that have grown up around them are scattered along the main waterways of the Mackenzie valley from Fort Smith to the Arctic coast. From south to north they are as follows:—

Forth Smith, on the left bank of Slave river at the foot of Slave rapids and just within Mackenzie District, being immediately north of latitude 60° North; Resolution, on the south shore of Great Slave lake and west of the mouth of Slave river; Hay River, on the south shore of Great Slave lake and at the mouth of Hay river; Providence, on the right bank of Mackenzie river about 40 miles below Great Slave lake; Simpson, on an island adjacent to the left bank of Mackenzie river immediately below the mouth of Liard river; Wrigley, on the left bank of Mackenzie river about 135 miles below Simpson; Norman, on the right bank of Mackenzie river immediately above the mouth of Bear river; Good Hope, on the right bank of Mackenzie river about 10 miles south of the Arctic circle and near the mouth of Hare Indian river; Arctic Red River, on the left bank of Mackenzie river at the mouth of Arctic Red river; McPherson, on the right bank of Peel river about 15 miles above the head of the delta, and Aklavik, on the right bank of the westerly channel of Mackenzie delta and about 50 miles from the coast.

Liard, on Liard river about 190 miles above Simpson, and Rae, on the north arm of Great Slave lake, are other important posts that have had a history corresponding to those along the main route of travel. Herschel, on Herschel island, though within the political boundaries of Yukon Terri-

WATERFRONT AT SIMPSON

Hudson's Bay Company's post left, Anglican Mission centre, Mackenzie river right.

tory, in reality constitutes an important distribution centre in the fur trade of the Mackenzie coastal regions and for many decades has been the rendezvous of traders and whalers in the western Arctic.

There are about a dozen small trading posts in the Mackenzie delta in addition to Aklavik. Along the Mackenzie coast from the delta to the west side of Bathurst inlet there are upwards of 25 small establishments, most of which are of a temporary character. The most pretentious of these are Kittigazuit, Baillie and Bernard Harbour.

Among the many small posts that have been opened during recent years in the interior of the district might be mentioned that of Fort Reliance. It occupies a site in the vicinity of the original Fort Reliance, established as a base for explorations in 1833 by Lieutenant Back. From it, he followed the "Great Fish" river, now called Back river in his honour, to the Arctic coast.

Another link with the past was renewed by the establishing of a little post on the site of Sir John Franklin's Fort Franklin on the southwest arm of Great Bear lake. Numerous other posts or outposts are now to be found in the country south of Great Slave lake and east of Slave river, about the mouth of the South Nahanni river, and at points between the larger settlements along the main waterway.

It has been mentioned that the fur trader was accompanied or followed, and in a few instances preceded, by the missionary and the representative of the Royal Canadian Mounted Police. The growth of little settlements about these strategical trading posts can be readily visualized. The whole economic and social life of the District soon came to be centred in these several communities. Conditions to-day are but little changed with the exception of a single hotel in Fort Smith. The visitor to Mackenzie is dependent on the traders, missions, police or other government officials for transportation and accommodation.

The Hudson's Bay Company is still the largest fur trading operator in Mackenzie District. It has the largest and most complete establishments throughout the District, as well as the most extensive transportation system. Northern Traders Limited, formerly known as the Northern Trading Company, Limited, takes second place with a widely distributed chain of posts and a very effective transportation service. Several other companies and many individual traders are included in the full list of operators.

FUR-BEARING ANIMALS

The fur-bearing animals of Mackenzie District are more numerous and include a larger variety of species than those of any other part of the Northwest Territories. The wooded areas of the Mackenzie valley are particularly prolific in fur-bearing animals, while from the mountainous regions west of the Mackenzie certain species are found that do not inhabit Keewatin or Franklin Districts. Along the Arctic coast and on the plains north and east of its great lakes, great quantities of white furs common to the Arctic regions are found.

A list of the commercial fur-bearers of Mackenzie District includes the following species:—Bear—black, grizzly and white; beaver; coyote; ermine; fisher; fox—blue, cross, red, silver and white; lynx; marten; mink, muskrat; otter; skunk; wolf and wolverine. In the trade returns for the licence year

1927-28 the greatest number of pelts of any one species were those of the muskrat, totalling 154,490; white fox accounted for 11,221; ermine, 8,289; marten, 7,732; beaver, 7,287; mink, 3,586; lynx, 2,621; red fox, 2,389 and cross fox, 1,039. Of the other species mentioned each contributed less than 1,000 pelts to the year's total.

The fur trade gives employment directly to a great number of people and indirectly to the entire population. The monetary value of the output of Mackenzie District is probably at least two-thirds that of the entire Territories which for a recent year was estimated to be about $3,000,000.

GAME

In a preceding section a summary of the wild life of the Northwest Territories was given. In sections that follow more detailed information is given respecting certain species of big game animals. To avoid unnecessary repetition it may be briefly stated here that the economic game of Mackenzie District includes the following species: bison (wood buffalo), moose, woodland caribou, barren-ground caribou, musk-ox (now on permanently protected list), mountain goats and mountain sheep (along the Yukon-Mackenzie divide), and hares which form an important item of diet for the Indians. Game birds taken as supplementary food include resident ptarmigan and other grouse and several species of migratory geese and ducks.

FISH

The fisheries of Mackenzie District play a very important part in the economic life of both natives and whites. Fish are used extensively for human consumption at all the establishments along the principal waterways, the mission schools being particularly dependent on the harvest of their nets. The principal species have been outlined in a preceding section and need not be repeated here but it will be readily understood that in a country of scanty resources the fisheries have an unusual value as food for the inhabitants. The fish of Mackenzie are in demand also as food for the many dogs on which winter transportation is so largely dependent. Though generally regarded as being plentiful, the valuable fish supply of Mackenzie District has at times fallen short of meeting current demands.

The coastal waters of Mackenzie district still supply the native Eskimo with seals, white whales and other aquatic life on which he is so dependent for his existence. With the exception of the right whale, it would appear that the resources of the Arctic waters adjacent to the Mackenzie coast have not diminished in recent years.

Natural conditions for fur-bearing and game animals, many species of game birds, fish and aquatic mammals are favourable in the Mackenzie. The taking of any species of wild life to excess must sooner or later result in its extermination. With a judicious enforcement of a reasonable policy of conservation, the Government is hopeful that the wild life of Mackenzie District will continue to provide both natives and whites with a direct supply of food and an annual harvest of furs.

TRANSPORTATION AND COMMUNICATIONS

The Mackenzie river and its tributary waters are the main arteries of travel and commerce through Mackenzie District. Shallow-draught, stern-wheel steamboats can navigate the main course from Fort Smith, on the south boundary of the district, to the Arctic coast at its northwest extremity. The extreme southwest tip of the district can be reached by way of the Liard, while several minor tributaries are navigable for many miles by smaller power boats. The long arms of Great Slave lake and the deep bays of Great Bear lake enable boats operating thereon to penetrate deep into interior regions. Augmented by the indispensable canoe, the fleet of power boats operating on these waters is able to meet the primary requirements of all parts of the interior of Mackenzie District with more than the ordinary degree of success accompanying pioneer stages of transportation.

The city of Edmonton, Alberta, is primary head-quarters for transportation on the Mackenzie waterways. Between it and Fort Smith there are two principal routes, one by way of Athabaska river and the other by way of Peace river. Either river is reached by rail but the former route has the advantage of being shorter and of avoiding a midway portage as involved in the Peace route.

Before either of these rivers could be reached by rail, an earlier route had long been followed. It involved a wagon trail of about a hundred miles (later overcome by rail) from Edmonton to the Athabaska river at Athabaska Landing and then a long and difficult voyage by canoe or scow on a section of the river badly broken by rapids as far as McMurray. Even before this route was followed a still earlier one had reached the Athabaska at McMurray from the far east by way of the Churchill river and the famous "long" portage to the Clearwater.

ROUTES FROM EDMONTON

The present route from Edmonton to the north by way of Athabaska river follows first the Northern Alberta railway (Alberta Great Waterways division) to Waterways, its northerly terminus, located on the Clearwater river, 3 miles above McMurray. The length of the railway is 300 miles. It was completed to its present terminus in 1925, though for a few years before that it had been built as far as the edge of the Clearwater valley. The rapids on that part of the Athabaska between the old landing and McMurray are entirely avoided by following the railway, and freight can now be loaded direct from cars to steamboat.

From Waterways a number of steamboats are operated by way of the Clearwater and Athabaska rivers, lake Athabaska and the Rocher and Slave rivers to Fitzgerald, at the head of the series of rapids extending to Fort Smith. Fairly satisfactory navigation is found on these waters though there are certain disadvantages. The outlet of Athabaska river is in the nature of a wide, shallow delta and the passage is quite intricate and uncertain. Ice on the lake sometimes delays the opening of navigation in the spring for several days after the rivers are open and storms make the crossing of the lake hazardous at any time. On the whole, a fairly regular schedule of sailings is maintained during the season.

By the Peace River route, the Northern Alberta railway (Edmonton, Dunvegan and British Columbia and Central Canada divisions) is followed first from Edmonton to the town of Peace River, a distance of 316 miles. Peace River is located on the right bank of the Peace immediately below the mouth of its principal tributary, the Smoky. There is then uninterrupted navigation down stream to Vermilion chutes, as well as up stream to Hudson Hope. At the chutes, passengers and cargoes must be transferred to other boats that operate on the lower section. A 4-mile portage on which horse-drawn and mechanical transports are operated is met with here. Connecting steamers or gas boats then complete the run to Fitzgerald by way of the lower Peace and Slave rivers.

CATTLE NEAR FORT SMITH

Cattle have been raised for many years by the Roman Catholic and Anglican Missions at Fort Smith, Resolution, Hay River, Providence and Simpson.

From Fitzgerald to Fort Smith there is a 16-mile wagon road over which all traffic must pass as the rapids are not navigable. Automobiles, trucks and tractors are operated on it and passengers and freight are transferred with little delay. This break in navigation makes of Fort Smith a particularly strategic gateway to the district.

Steamboats, motor boats and, on the lakes, schooners, then operate on the unbroken chain of waterways comprising the lower Slave river, Great Slave lake and Mackenzie river, as well as on the lower sections of the Liard, Peel and other tributary rivers. The mouth of Slave river is in the nature of a delta and the channel there is, like that of the Athabaska, quite intricate and is buoyed out each year by the Dominion Government. Sudden storms are not uncommon on Great Slave lake and its navigation by shallow-draught river steamboats or small craft is not without risk. The Mackenzie river widens out below Providence to lake-like proportions for some distance but below that it has a strong, steady current. The ramparts near Good Hope are very picturesque and at low stages of water the Sans Sault rapids, in their vicinity, assume proportions dangerous to small craft and troublesome to the ascent of large boats.

The opening of navigation on this section depends on the breaking up of the ice on Great Slave lake. This is usually two or three weeks, and

some years as much as a month, later than on the rivers. To avoid delays arising from this condition, travellers sometimes portage their canoes from Fort St. John, on the upper Peace river, to the Fort Nelson river, and then descend that river to the Liard and thence to the Mackenzie. Others portage from Fort Vermilion, on the lower Peace, to the upper Hay River post and descend Hay river. Both of these routes have their disadvantages. A long portage is involved in either case. Low water is apt to be encountered on the Fort Nelson, while on the Hay, portages have to be made around Alexandra and Louise falls. During the oil rush both these routes were followed by a few parties but the conventional route is that following the main waterways.

Commercial navigation is controlled almost entirely by the Hudson's Bay Company. The service was primarily intended for the carrying of the company's own freight and employees, but now is available to the public. The government's local organization, the Anglican and the Roman Catholic Missions, the Royal Canadian Mounted Police and some smaller traders and prospectors operate motor boats and schooners as required for their own purposes. The Indians travel extensively by canoe and the Eskimos of the coast and delta regions possess a number of power schooners.

There are no railways and no highways in Mackenzie District. Summer travel, other than by water or air, is almost unknown. Winter travel is by dog sleigh or, under favourable conditions, by air. Commercial aerial navigation has been proved practical and this method of transportation is to be had by arrangement.

DISTANCES

Distances involved in travelling from Edmonton to Fort Smith, the gateway to Mackenzie District, and over the principal routes through the district itself, are shown on the following statement, as compiled from survey returns. Sailing distances are probably quoted somewhat greater.

TABLE OF ROUTES AND DISTANCES TO AND IN MACKENZIE DISTRICT

	Miles
Edmonton to Fort Smith—	
(1) Athabaska River route—	
Edmonton to Waterways, via rail	300
Waterways to McMurray, via Clearwater river	3
McMurray to Chipewyan, via Athabaska river and lake Athabaska	193
Chipewyan to Fitzgerald, via Rocher and Slave rivers	93
Fitzgerald to Fort Smith, via portage	16
Total	605
(2) Peace River Route—	
Edmonton to Peace River, via rail	316
Peace River to Vermilion chutes (head) via Peace river	300
Vermilion Chutes portage	4
Vermilion Chutes (foot) to Fitzgerald, via Peace and Slave rivers	275
Fitzgerald to Fort Smith, via portage	16
Total	911

Fort Smith to Northern Points—

Fort Smith to Resolution, via Slave river and Great Slave lake	203
(*Side trip*—Resolution to Rae via Great Slave lake, 150 miles).	
(*Side trip*—Resolution to site of Fort Reliance via Great Slave lake, 230 miles).	
Resolution to Hay River, via Great Slave lake	75
Hay River to Providence, via Great Slave lake and Mackenzie river	78
Providence to Simpson, via Mackenzie river	156
(*Side trip*—Simpson to Liard, via Liard river, 190 miles).	
Simpson to Wrigley, via Mackenzie river	152
Wrigley to Norman, via Mackenzie river	150
(*Side trip*—Norman to Great Bear lake, via Bear river, 75 miles).	
Norman to Good Hope, via Mackenzie river	171
Good Hope to Arctic Red River, via Mackenzie river	214
(*Side trip*—Arctic Red River to McPherson, via Mackenzie and Peel rivers, 55 miles).	
Arctic Red River to Aklavik, via Mackenzie river	98
Total—Fort Smith to Aklavik	1,297
Aklavik to Arctic coast	60
Aklavik to Shingle Point, Y.T.	110
Aklavik to Herschel island, Y.T.	175
Aklavik to Kittigazuit	169

RIVER STEAMBOATS

The principal boats serving the interior of Mackenzie district are those operated by the Hudson's Bay Company. On the Athabaska-Fitzgerald run and the Lake Athabaska service are the *Athabaska River,* the *Northland Echo* and the *Slave River* steamboats, and the motorboat *Canadusa.* On Peace river, above the chutes, are the commodious steamboat *D. A. Thomas,* and the motorboat *Weenusk.* On the main Mackenzie

THE STEAMBOAT *DISTRIBUTOR* ON MACKENZIE RIVER

The principal type of steamboat used on the Mackenzie waterways is the shallow-draught, stern-wheel type shown above. Local wood is used as fuel.

river run from Fort Smith to McPherson and Aklavik are the *Distributor*, sister boat to the *D. A. Thomas*, and the *Mackenzie River*. The *Liard River* is kept on the run from Simpson to Liard and Nelson.

As a rule navigation opens on Athabaska river about the end of May and closes early in October. During this period there are bi-weekly sailings in both directions. Navigation on the Peace opens and closes about the same dates with weekly sailings.

Owing to ice conditions on Great Slave lake, the opening of navigation on the Mackenzie river is very uncertain. It is usually some time in June but has been as late as the first week of July. During recent years three or more round trips per season have been made between Fort Smith and Aklavik, and extra trips as far as Simpson or Norman.

COASTAL SERVICE

The coast regions of Mackenzie District are served by an entirely different route. Seagoing vessels, sailing from Victoria, Vancouver, and other Pacific ports, enter Arctic waters by way of Bering straits and, skirting the north coast of Alaska, arrive in Mackenzie bay. For many years Herschel island, which is attached to the Yukon Territory, was headquarters for coastal transportation in these regions. Between Herschel and the lower river posts of Aklavik and McPherson there is an occasional connection by power schooners but no regular schedule is maintained. From McPherson to Aklavik is about 55 or 60 miles and from Aklavik to Herschel 175 miles.

The shallow-draught steamboats that operate on the Mackenzie river are not fitted for deep sea navigation and are not taken beyond the delta of the river. Deep sea vessels cannot enter the river because of its shallowness so that there is a gap in transportation services and direct connection between the larger vessels cannot be made.

Aklavik, the present northern terminus of river steamboats, is situated on the west channel of the Mackenzie, there being three principal outlets of the river through its delta. The distance from Aklavik to the sea is about 50 miles.

From Herschel, boats make their way easterly along the coast through Amundsen gulf, Coronation gulf and Dease strait, serving a number of posts scattered along the mainland, the principal of which are Kittigazuit, Baillie, Bernard Harbour, Coppermine and Tree River, as well as Cambridge Bay on Victoria island. Schooners make occasional trips, in favourable seasons, as far east as Queen Maud gulf and by way of Simpson strait to Peterson Bay on the south coast of King William island. Boothia peninsula then halts further progress in that direction. The much sought but almost impracticable "North-West Passage" must be made to complete the connection between western and eastern Arctic waters.

MAIL

The Post Office Department of Canada maintains the following post offices in Mackenzie District:—Fort Smith, Fort Resolution, Hay River, Fort Providence, Fort Simpson, Wrigley, Fort Norman, Fort Good Hope, Arctic Red River, Fort McPherson and Aklavik. Mail is carried to these

offices from Edmonton, the first part of the route being by rail to Waterways. Waterways post office is located at the end of steel and Fort McMurray post office at the confluence of the Clearwater and Atkabaska rivers. Between Fort McMurray and Fort Smith there are two intermediate post offices—Fort Chipewyan and Fort Fitzgerald. The four offices south of Fort Smith are in Alberta but they are included in the Mackenzie river mail service as is also Herschel Island post office which is in the Yukon Territory.

During the season of open navigation these offices as far north as Fort Simpson have been provided with a weekly mail service. North of Fort Simpson the summer schedule of 1929 called for seven mails to Wrigley and Fort Norman, six to Fort Good Hope, five to Arctic Red River, Fort McPherson and Aklavik and three to Herschel Island. The offices as far as Fort Simpson were scheduled to receive nine mails during the summer.

Arrangements were made by the Post Office Department for the carrying of occasional mails by the Hudson's Bay Company to Rae and Liard. Way sacks for the exchange of mails between intermediate points were provided.

In November, 1929, the Post Office Department inaugurated a winter air mail service to Mackenzie river offices. The contract for this service was awarded to Commercial Airways Limited, of Edmonton. A flying base was established at McMurray for this work.

The announced schedule calls for a weekly service between November 26, 1929, and April 8, 1930, to Fort Chipewyan, Fort Fitzgerald, Fort Smith and Fort Resolution. Hay River, Fort Providence and Fort Simpson are to receive six mails and Wrigley, Fort Norman, Fort Good Hope, Arctic Red River, Fort McPherson, Aklavik and Herschel Island three mails during this period. Out-going mail will be carried on all return trips of the planes.

RADIO STATIONS

When the Northwest Territories came into prominence in 1921 there arose an insistent demand that the country be supplied with better means of communications. After careful consideration, the conclusion was reached that wireless might be advantageously installed in the Northwest and Yukon Territories.

After some negotiations, arrangements were made with the Department of National Defence for the establishment and operation of a number of stations by the Royal Canadian Signals (Permanent Force). This corps, which has a strength of 45 officers and 268 other ranks, all highly qualified in the various branches of the work, has provided important links in the Dominion's chain of communications. It has co-operated with various government departments by establishing and operating radio stations, and with the Dominion Government Air Services in air-to-ground and ground-to-air radio communication.

In the system that was established during following years there are eight stations located at the following points:—Edmonton, in Alberta, Fort Smith, Resolution, Simpson and Aklavik, in Mackenzie District, and Herschel, Dawson and Mayo Landing, in the Yukon. It is proposed to establish another station at Whitehorse, Yukon, in 1930.

The Canadian National Telegraphs and the Canadian Pacific Telegraphs at Edmonton are both connected by direct wires to the terminal wireless station at West Edmonton.

The range of the stations is 600 to 700 miles. The type is the standard Royal Canadian Signals 500 watt, and power is supplied by 5 kilowatt, 110 volt oil engines, and 160 ampere hour station batteries.

The station at Herschel is operated during the season of navigation only. By arrangement, the motor ship *Baymaud,* belonging to the Hudson's Bay Company, which has wintered at Cambridge Bay, and the *St. Roch,* belonging to the Royal Canadian Mounted Police, which has wintered at Coppermine, handled traffic at these points.

The stations in the Northwest and Yukon Territories forward weather reports twice daily to the headquarters of the Meteorological Service at Toronto. Special weather bulletins are supplied to Air Services on request. Daily news bulletins, which are prepared by the North West Territories and Yukon Branch, are broadcasted to and published at most of the stations.

ORGANIZATION AND PUBLIC WELFARE

In 1921 the North West Territories and Yukon Branch of the Department of the Interior despatched an organization party to Fort Smith for the purpose of establishing an agency at that point that should deal

GOVERNMENT HEADQUARTERS, FORT SMITH

The District Agent of the North West Territories and Yukon Branch makes his headquarters at Fort Smith. His official residence is shown above.

directly with affairs relating to the disposal of natural resources and the administration of Mackenzie District in general. Staff and material for the erection of the necessary buildings, a complement of officers and

clerks to take charge of affairs and supplies for their maintenance were included in the expedition. During the summer a building for office purposes and a residence for the staff that was to remain were erected.

Temporary offices were opened in tents immediately upon the arrival of the party and the receiving of applications for oil and other leases began at once. The officer in charge had been appointed as District Agent. He was delegated as Mining Recorder and Dominion Lands and Crown Timber Agent for Mackenzie District. Other offices in charge of sub-agents were opened for a time during the rush of that year at Resolution and Norman.

Later, when Wood Buffalo Park was created, the District Agent was made Superintendent of it. The local organization now consists of a District Agent whose duties include those of Mining Recorder, Dominion Lands Agent, Crown Timber Agent, Superintendent of Wood Buffalo Park and Chief Fire Warden. He is a Justice of the Peace and a Notary Public. He is also Postmaster under the Post Office Department and has charge of wharfs and aids to navigation for the Department of Marine and Fisheries. His staff consists of an assistant and two clerks, a park warden and twelve game wardens and four seasonal fire wardens for the Simpson and Liard districts.

SPECIAL INVESTIGATIONS

In order to obtain direct information of existing conditions and natural resources in Mackenzie District, the Commissioner of the Northwest Territories has had a number of special investigations made. Since 1921 these have been carried out principally by officers of the North West Territories and Yukon Branch of the Department of the Interior, but engineers from some of the other branches have assisted in the work. The necessity for ascertaining the condition of the Eskimos and for determining a policy that would ensure their permanent welfare was accentuated in 1927 when their official care was transferred from the Department of Indian Affairs to the Commissioner.

In 1920, F. H. Kitto, Engineer, Natural Resources Intelligence Service of the Department of the Interior, made a brief investigation of the natural resources and general conditions in Mackenzie District. He travelled by canoe down the Mackenzie waterway to the delta, crossed over to the Yukon by the Rat and Porcupine rivers and returned by way of the Yukon river and the Pacific coast.

The Director, Assistant Director and Chief Inspector of the North West Territories and Yukon Branch have individually visited the District at various intervals in connection with administrative matters. The District Agent has touched at all principal points in the performance of his duties. A feature of unusual interest was a pioneer flight made by the Director in 1929 from Aklavik, in the Mackenzie delta, to Dawson, in the Yukon.

Field officers of the North West Territories and Yukon Branch who have conducted special investigations are Major L. T. Burwash, W. H. B. Hoare and A. E. and R. T. Porsild. During the years 1925-26 Burwash made a study of the economic condition of the Eskimos along the Mackenzie coast and as far east as Hudson bay. Hoare, during 1924-25-26 carried out

investigations of wild life with particular reference to its bearing on the welfare of the Eskimos and again during 1928-29 continued his study of wild life in the Thelon game sanctuary. A. E. and R. T. Porsild, during the years 1926-27-28, examined large areas of lands adjacent to the Mackenzie coast with a view to determining their value as future reindeer pastures. These investigations are referred to at greater length in succeeding sections.

G. H. Blanchet, of the Topographical Survey Branch, Department of the Interior, carried out intensive explorations of the country surrounding the east half of Great Slave lake during the years 1921 to 1925. His travels reached well into the treeless areas and his work included the surveying of many features not shown, or incorrectly shown, on existing maps.

MEDICAL AND EDUCATIONAL MATTERS

Other activities include the establishment, under the direction of the Chief Medical Health Officer of the North West Territories and Yukon Branch, of two medical depots in Mackenzie, each in charge of a medical health officer. These are located at Aklavik, in the Mackenzie delta, and at Coppermine, in Coronation gulf, and have the health of the Eskimo primarily in view. Three medical officers of the Department of Indian Affairs act also as medical health officers for the Northwest Territories administration.

The Department of the Interior has no public school system in Mackenzie District but grants for educational purposes are made to the Anglican and Roman Catholic Missions, both of which maintain day and boarding schools for white and native children in connection with their general mission work.

The Anglican Mission has a day school at Fort Smith (at present not functioning), a boarding school for Indian and Eskimo children at Hay River, a day school at Simpson, a day school at McPherson, a day school at Aklavik and a day school at the mouth of Coppermine river. A boarding school for Eskimo children was established recently at Shingle Point (Yukon) on the Arctic coast but it is intended that this school will be re-located at the new settlement that is to be established at or near the mouth of the east branch of Mackenzie river.

It is reported that a day school for Eskimo children is to be opened shortly at Cambridge Bay, which is in Franklin District but this school will receive Eskimo pupils whose parents are part time residents in Mackenzie.

The Roman Catholic Mission conducts a day school at Fort Smith, a boarding school for Indian and half-breed children at Resolution, a similar boarding school at Providence, a day school at Simpson, a summer day school at Wrigley, a day school at Good Hope and a boarding school for Indian and Eskimo children at Aklavik. In addition to these schools provision for the holding of classes for children temporarily gathered in the vicinity is provided at all points where there are branches of the Mission.

Grants are made by the Department of Indian Affairs for the maintenance at these several boarding schools of orphan or destitute Indian

children of tender years. The Northwest Territories administration makes similar provision in the case of white or half-breed orphan or destitute children up to sixteen years of age.

The total number of children attending the several day and boarding schools fluctuates from season to season. There are very few white children and their attendance is made uncertain by the frequent change of

ALL SAINTS' HOSPITAL, AKLAVIK

This hospital is conducted by the Anglican Missions of the Northwest Territories.

residence of their parents. Most of the white men of Mackenzie District who have children of school age are employees of the fur trading companies or of the Dominion Government and are transferred from post to post as exigencies arise.

Several half-breed children are found in both day and boarding schools but the largest group is comprised of Indians. All schools undertake to impart a general elementary education and the boarding schools supplement their regular class study by manual training, gardening and other practical instruction for the boys and lessons in sewing, fancy work, cooking and general housework for the girls.

Hospitals are maintained at principal centres by the Missions and receive a certain amount of financial assistance from the Departments of the Interior and Indian Affairs. The Anglican Mission has a small hospital at Hay River and a larger one at Aklavik. The Roman Catholic Mission has a three-story frame hospital at Fort Smith, a similar one at Simpson and a smaller one at Aklavik. All hospitals are in charge of trained nurses, those conducted by the Roman Catholic Mission being under the special care of the Order of Grey Nuns.

Most of the government and police officials have some training in first aid work and all offices and posts are provided with first aid equipment. Patrols or tours of inspection are made from time to time by members of

the police force or by resident or head office officials of the Government for the purpose of keeping in touch with the population at large and directing such measures as may seem necessary for the welfare of all the people.

In all measures adopted for the furthering of the development of the country, the welfare of the native and resident population is given primary consideration. Humanitarian reasons, of course, demand this, but it is felt by close observers that the successful development of the North will depend to a large degree on the co-operation of a healthy and contented native population.

NATIVE POPULATION

The Minister of the Interior is also Superintendent General of Indian Affairs and the welfare of the aboriginal population is carefully safeguarded in all administrative arrangements of the Northwest Territories. Indian matters are in charge of the Deputy Superintendent General of Indian Affairs, while Eskimo affairs are the responsibility of the Department of the Interior.

DISTRIBUTION AND NUMBER OF INDIANS

The Indians of the Northwest Territories are of the Athapascan linguistic group and the following tribes are represented: Chipewyans, Yellowknives, Slaves, Dog Ribs, Hares and Loucheux. Theoretically they speak the same mother tongue, but in the course of time several dialects have developed and become distinctly differentiated. Indeed, it is only with difficulty that the tribes converse with each other.

The general locations of these several tribes are as follows: The Chipewyans are found along the Slave river from the south boundary of the Northwest Territories to Great Slave lake. The Yellowknives are found now in the vicinity of Resolution on the south shore of Great Slave lake. They formerly lived in the country lying between Great Slave lake and the Coppermine river but were driven from there by the Dog Ribs. The Slaves are distributed over a wide range of country including Hay river, the west end of Great Slave lake, the Mackenzie river as far north as Wrigley, and the lower part of Liard river. The Dog Ribs inhabit the country between Great Slave lake and Great Bear lake and make frequent excursions into the Northern Plains. The Hares are found along the Mackenzie river in the vicinity of Norman and Good Hope, and the Loucheux in the Mackenzie delta and about Arctic Red river, and McPherson on Peel river.

The number of Indians in the Northwest Territories has been placed by the Department of Indian Affairs from a census taken in 1929, at 4,150. It is somewhat difficult to arrive at an exact figure as there are several roving bands or families that have not taken treaty but the count is fairly accurate. Particulars are shown in the following statement.

INDIAN POPULATION, NORTHWEST TERRITORIES, 1929

Tribe	Locality of band	Number in band	Number in tribe
Chipewyans	Resolution	137	
"	Fort Smith	162	299
Yellowknives	Resolution	142	142
Slaves	Hay river	111	
"	Providence	251	
"	Liard	225	
"	Simpson	312	
"	Wrigley	91	
			990
Dog Ribs	Northern Plains		
"	Bear lake		
"	Marten lake		
"	Rae		
"	Slave lake		
"	Yellowknife river		
"	Resolution		
			952
Hares	Good Hope	309	
"	Norman	346	
			655
Loucheux	Arctic Red river	178	
"	McPherson	325	
			503
Nomads	Partially estimated		609
	Total		4,150

INDIAN TREATIES

It has been the general practice of the Dominion Government to acquire peaceful possession of new tracts of country, in advance of the march of settlement, by the making of treaties with the chiefs and head men of the natives.

As early as the year 1899 the Department of Indian Affairs made a treaty (No. 8) with the Indians to the south of Great Slave lake. In 1921 Treaty No. 11 was made with the several bands along the Mackenzie river and on the north shore of Great Slave lake, and in the following year treaty was concluded with those on the Liard river. Settlement has, therefore, been made with practically all the Indians of the Northwest Territories, whereby their aboriginal title has been ceded to the Crown.

INDIAN AGENCIES

The Department of Indian Affairs maintains two agencies in Mackenzie District, one with headquarters at Resolution and the other with headquarters at Simpson. Each is in charge of a resident agent. The agent at Resolution is also a medical officer. Additional medical officers are stationed at Fort Smith and at Simpson. The territory immediately

adjacent to Fort Smith is under the care of the agent now stationed at McMurray in Alberta. The Department is now contemplating the establishment of a third agency at Good Hope for those bands within the Arctic circle.

The Medical Officer of the North West Territories and Yukon Branch, who is stationed at Aklavik, devotes part of his time to the care of the Indians in that vicinity under the direction of the Department of Indian Affairs. The regular medical officers of the Department of Indian Affairs act also as medical officers for the North West Territories and Yukon Branch at Fort Smith, Resolution and Simpson.

INDIAN BOYS AT PLAY

These boys are pupils of the Roman Catholic Mission boarding school at Providence, Mackenzie District.

The hospitals maintained by the Anglican and Roman Catholic Missions at Fort Smith, Simpson and Aklavik receive Indian patients for which they are paid established per diem rates by the Department of Indian Affairs, and by the Department of the Interior.

The Department of Indian Affairs, in association with Roman Catholic and Church of England missionaries, maintains a few day schools and four residential schools for Indian children. The boarding schools, which are at Resolution, Hay River, Providence and Aklavik, are the most important Indian educational establishments in the Northwest Territories. Pupils are accepted at seven years of age and remain in residence until they are sixteen or seventeen, receiving vocational training as well as academic instruction.

LOCATIONS AND NUMBERS OF ESKIMOS

In the general survey of the inhabitants of the Northwest Territories, appearing in Part I of this report, all the Eskimos of Mackenzie District were included in one division, the Western Arctic. The survey included also those inhabiting the opposite coasts of Banks and Victoria islands as

well as a number of small islands adjacent to the mainland coast, all of which islands are within the boundaries of Franklin District. The total number given for the whole division was 1,650, of which 313 were allotted to Banks and Victoria islands and the balance to the mainland and adjacent small islands.

The mainland Eskimo population of this division was recorded in 11 groups. From west to east the location and numbers of these groups were: Mackenzie delta, 400; cape Bathurst, with Baillie post as centre, 126; cape Parry, 40; Pearce point, 30; Clifton point, 66; Bernard harbour and vicinity, 149; west end of Coronation gulf, 78; Coppermine and Dease Rivers and Dismal Lakes area, 60; Tree River post and vicinity, 53; Bathurst inlet, 275 and Kent peninsula, 60. These 11 groups show a population of 1,337.

It must be borne in mind that the Eskimo is a nomad and does not become domiciled in any particular locality. He moves from place to place during the year as influenced by the sources of his food supply, trapping opportunities, climatic conditions or other causes. The scarcity of game may result in his leaving certain parts of the country for years at a time.

Between the mainland and the islands of the Western Arctic there is a constant movement of population. At one time during recent years when the caribou failed to cross to Victoria and Banks islands, it was reported that practically the entire population of these islands migrated to the mainland. No sharp division, therefore, can be made between the Eskimo population of Mackenzie District and the Western Arctic portion of Franklin District.

In like manner, the Western Arctic subdivision and the Yukon subdivision are but temporary and arbitrary classifications. The census of 1927 reported 300 Eskimos along the coast from the Mackenzie delta to the Yukon-Alaska boundary line and on Herschel island. These were shown in three groups as follows: Shingle point, 50; Firth river and Herschel island, 200; and Demarcation point, 50. While at the time of the taking of the census this particular number of Eskimos was found within the boundaries of Yukon Territory, it does not mean that they are permanently located there. They might broadly be included as part of the Mackenzie Delta population as they trade at the delta posts and shift their living quarters over a wide range of coast according to changing conditions.

MACKENZIE DELTA ESKIMOS

Of all Canadian Eskimos, those found in the Mackenzie delta and west and east respectively as far as the Yukon-Alaska boundary and cape Parry or Pearce point are the most advanced in civilization. They are known as the Mackenzie Eskimos while those along the eastern part of the coast of Mackenzie District and on the islands of the Western Arctic have been classified as Copper Eskimos.

ESKIMO FISHING CAMP ON MACKENZIE COAST

The Mackenzie Delta Eskimos are possessors of many high-powered motor schooners and are in a prosperous condition.

Respecting the Mackenzie Eskimos, W. H. B. Hoare, Investigator for the North West Territories and Yukon Branch, who has spent many years among them, says:—

"It is perhaps not too much to say that as a people the Mackenzie Eskimos are exceptionally prosperous and happily situated. This is due to various causes. By long custom they are a very provident people. The sea, being within easy reach, supplies them with an abundance of seals and white whales during the summer; the rivers, as well as the sea, abound in the finest edible fish; while game birds and land animals provide a pleasing change of diet in season. A surplus of all these foods is laid aside to provide for times of scarcity.

"The situation is also remarkable for the number and variety of valuable fur-bearing animals that may be taken. The district has been entered by individual traders as well as by the larger companies so that there is a sharp competition for pelts. The Eskimos are shrewd traders and drive keen bargains, with the result that they have become wealthy. No longer are they ignorant savages dwelling in snow igloos in winter and forced to eke out a pitiful existence in a terrific struggle against all the forces of nature. The igloos have given place to comfortable winter dwellings of logs or rough lumber, in many cases finished with wall-board and dressed lumber.

"White flour, sugar, butter, jam, canned fruit and other luxuries are included now in their diet. Long winter evenings are passed pleasantly listening to good music provided by expensive gramophones and radio sets. Brass and iron spring beds take the place of the old family couch of skins. Up-to-date sewing machines make the lot of the women easier.

"Highly powered motor schooners, costing from $3,000 to $7,000 each, provide floating summer homes as the people move about the delta or along the sea coast in search of sea animals or to visit the trading posts. Cameras, watches, thermos bottles, safety razors, high-powered rifles and many other products of modern civilization are in general use. Practically all these Eskimos can read and write in their own tongue and most of them have a fair grasp of English."

INVESTIGATIONS BY MAJOR L. T. BURWASH

Though general and ethnological studies of the Canadian Eskimos had been made in former years by certain scientists as previously indicated, the North West Territories and Yukon Branch was in possession of comparatively little practical information that could be made use of in formulating a policy for their welfare. Consequently it was decided to have an economic investigation made by the Branch's own officials and Major L. T. Burwash, Exploratory Engineer, was given instructions accordingly to begin the work in Mackenzie District.

During the summer of 1925 he proceeded to the mouth of the Mackenzie river and before the end of the year had travelled easterly along the Arctic coast as far as King William island where he established his winter quarters. Numerous short excursions were made from that base and a direct contact was established with several groups of Eskimos. First-hand information concerning the number and condition of the people themselves was thus secured as well as an insight into their living conditions.

In the early spring of 1926 Major Burwash proceeded by dog sleigh from King William island to Repulse bay, a journey of 1,000 miles, including relays and side trips, on which he crossed Boothia peninsula, the lower part of the gulf of Boothia and Rae isthmus. From Repulse bay the journey was continued by whale-boat along the west coast of Roes Welcome and Hudson bay to Chesterfield inlet. From Chesterfield the return trip to civilization was made by a Hudson's Bay Company's steamer.

The multiplicity of duties undertaken in connection with this expedition included the making of a general economic survey, an Eskimo census of the districts visited, noting the prevalence of wild life on land and in the sea, evaluating the general natural resources, noting the geology of the country, collecting botanical and biological specimens, securing typical photographs of the natives and the country, studies in anthropology, searching for traces of the Franklin expedition, keeping temperature and barometer readings and weather reports, making tidal measurements, observing ocean currents, obtaining compass variations and making traverse surveys. The net result was a vast fund of up-to-date and practical information and a collection of valuable photographs and specimens.

Commenting on the Eskimos that inhabit the eastern parts of the Mackenzie coast, Burwash draws attention to a gap or barrier that existed till recent times between them and the Mackenzie Eskimos. The Copper Eskimos were much later in coming in contact with the white man, and, though they are now nearly all armed with modern firearms, they have not attained the same degree of civilization as the more westerly tribes. With the establishing of trading posts as far east as Bathurst inlet, however, all the Eskimos of Mackenzie District are rapidly coming under the influence of the whites and are responding to it very actively.

In 1928 Major Burwash undertook a somewhat similar expedition, travelling to the Arctic coast by way of the Mackenzie river and thence eastwards on the department's small power schooner, the *Ptarmigan*, to King William island where he wintered again. His instructions called for

certain magnetic observations during the winter of 1928-29 and for an examination of the Coppermine mineral area during the summer of 1929, in addition to which further observance of the condition of the Eskimos encountered was to be made. This expedition has been brought to a successful termination by Burwash's recent return to Ottawa. When his report is completed it will throw additional light on the Eskimos of the Mackenzie District.

LANDS, FORESTS AND WATER-POWERS

The arable lands of the Northwest Territories are confined to the Mackenzie valley and are restricted by climatic conditions to its more southerly parts; nevertheless they are more extensive and fertile than generally believed. The rich alluvial banks of Slave river are capable of producing large quantities of cereals, hay, potatoes, vegetables and small fruits. There are also many favourable tracts of land along the south shores of Great Slave lake that, when cleared, drained and brought under cultivation, will prove equally productive. Lands adjacent to the lower parts of Hay river, to Mackenzie river from Great Slave lake to Simpson and to the lower part of Liard river, all come within the range of the Western Canada agricultural belt, though only certain favourable tracts are economically valuable for agricultural purposes under present-day conditions. While the soil is mostly good, it carries a fairly dense forest growth which involves a heavy expense in clearing. There is very little open prairie land. Surface boulders are found over much of this area and many parts lack natural drainage.

AGRICULTURE AND HORTICULTURE

Agriculture cannot be said to have been established as an independent industry but several small farms and gardens are cultivated in connection with the missions, Indian agencies and trading posts, and nearly all police officials and other white residents maintain kitchen and flower gardens. At Fort Smith there are several cultivated areas yielding a wide range of products. The Roman Catholic Mission has fields at Salt River, Resolution, Providence and Simpson, where wheat, oats and barley are fully matured in favourable years. Potatoes, vegetables, small fruits and flowers are produced in abundance. The Anglican Mission cultivates a piece of ground at the mouth of Hay river on the south shore of Great Slave lake that has produced remarkable yields of potatoes and vegetables.

Small gardens are cultivated at every post along the Mackenzie as far north as Good Hope, which is within ten miles or so of the Arctic circle. Potatoes in full bloom were photographed at this post by the writer on July 15, 1920, and new potatoes of a good size were secured from a garden at Resolution on July 12, 1921. It is reported that attempts to grow potatoes at McPherson and Aklavik have met with an occasional success.

The Dominion Experimental Farms include substations at Fort Smith, Resolution and Providence, where experiments are conducted and obser-

vations recorded with a view to determining the species of products and the methods of cultivation best adapted to these regions. While the growing season is short, the long hours of sunshine and continuous daylight that prevail at that time hasten the growth of all vegetation.

It appears, from a review of all available records, that fair to heavy yields of wild and domestic grasses of several species can be depended on every year. Potatoes and several kinds of common vegetables are fairly reliable but subject to injury by untimely frosts or droughts which cut down the yield or quality. Cereals mature fully in favourable years but sometimes wheat and barely are almost a total loss from frost injury and oats may be reduced to crops of green feed by the same cause.

POTATOES AT GOOD HOPE

These potatoes, though growing within 10 miles of the Arctic circle, were in bloom on July 15.

The following field products have been raised in Mackenzie District with varying degrees of success for many years:—wheat, oats, barley, western rye grass, brome grass, timothy, red top, fodder corn (occasionally), potatoes, turnips, cabbages, carrots, cauliflowers, Swiss chard, beans, beets, parsnips, celery, lettuce, onions, radishes, tomatoes, cucumbers (occasionally) and a few others.

Since the area under discussion is situated on the northern fringe of the agricultural belt, the risks from inclement weather are likely to be ever present. The general precipitation is rather small and crops suffer some years from drought. On the other hand, the introduction of earlier maturing varieties of cereals and vegetables, the better cultivation of the land and other progressive steps that the more scientific practice of agriculture will introduce, are bound to increase the general average of success in these pursuits.

GRAZING LANDS

Mackenzie District embraces numerous areas of grazing lands and moss-producing plains suitable as ranges for caribou or reindeer. The Thelon game sanctuary, in which remnant herds of musk-oxen are found, lies to the east of Great Slave lake and almost wholly within this District. The area selected as pasture grounds for the large herd of reindeer that the Dominion Government is introducing is in that region bounded by the Mackenzie and Coppermine rivers and Great Bear lake and the Arctic coast. Between Great Slave and Great Bear lakes there are further extensive areas of land suitable for the pasture of reindeer or caribou.

It might be mentioned also, in passing, that the bison thrives on the natural pasturage of the southern part of Mackenzie District; the moose browses throughout the wooded areas; and domestic cattle, if given shelter during the coldest weather and some protection from flies during the summer months, thrive on grazing lands about the settlements. A few horses are kept at Fort Smith and cattle have been raised for years at Fort Smith, Resolution, Hay River, Providence and Simpson. The grazing possibilities of the District are very great though the proper selection of animals and ranges, and expert supervision of herds, are essential conditions of utilization.

FORESTS

It has been mentioned that the forests of the Northwest Territories, other than for local uses, do not rank as a commercial asset. The scarcity of wood in the North, however, and the difficulties and expenses involved in the importation of sawn material combine to give to such forests as are found an unusual economic value.

The white spruce that flourishes along the banks of the Slave, Hay, Mackenzie and Liard rivers, on the shores of Great Slave lake and elsewhere as far as the Mackenzie delta, furnishes nearly all the sawn material used locally in the construction of buildings and small boats and scows. Sawmills are operated at or near Fort Smith, Resolution, Hay River and Simpson. Products of these mills are carried up or down stream by boat to be used as required anywhere from Fort Smith to Aklavik.

The Department of the Interior and the Hudson's Bay Company each operate a mill near Fort Smith. The Roman Catholic Mission operates one near Resolution; the Anglican Mission one at Hay River and the Department of Indian Affairs one at Simpson. Most of these mills are equipped with planers and other machinery required in the making of the necessary range of finishing material for buildings and of shingles.

The white spruce of the Mackenzie, when sawn and dressed, makes a very attractive and durable product. It has been used exclusively in the building of many churches, houses and trading stores and meets every requirement from roof to floor both outside and inside. With proper conservation there should be a perpetual supply of this wood, sufficient at least for the needs of the native population and those interested in their welfare.

Small quantities of black spruce are sawn but this wood is inferior to that of the white spruce. It is used to some extent in the construction of log cabins but more commonly as firewood. The jack pine is used also chiefly as fuel.

The wood of the tamarack is tougher than that of any other native tree. It is made use of in the local manufacture of boats, sleds and other articles for certain parts that call for extra strength.

Balsam poplar and aspen are used chiefly as fuel.

The wood of the canoe birch, when green, is soft and easily worked or bent into shape. When dry it becomes hard and durable and takes a high polish. These qualities make it of great economic importance in the manufacture of snowshoe frames, dog sleigh runners, toboggans, handles for axes and other tools, and for numerous other purposes. The bark was used formerly as covers for canoes but its use now is restricted chiefly to the making of baskets and other small articles.

SAW-MILL NEAR RESOLUTION, GREAT SLAVE LAKE

A few small saw-mills are operated in Mackenzie District. Limited quantities of white spruce are manufactured into sawn material.

The local fuel supply is augmented by great quantities of driftwood. In the alluvial valleys of the upper tributaries of the Mackenzie system many of the largest trees are found growing immediately along the banks of the rivers. These trees are being constantly undermined by the wearing away action of the currents and are carried down stream, particularly during high-water stages.

The shores of Great Slave lake are strewn with thousands of logs and trunks of large trees that have been carried into it by Slave river. Little of this wood finds its way out of the lake, but Liard river carries down a similar amount of drift-wood which floats down the Mackenzie. Large quantities of it are gathered up eagerly by the inhabitants of the more northerly section where wood is scarce.

WATER-POWERS*

Mackenzie District is traversed by many large rivers, and lakes both large and small are found in profusion throughout it. Water-power possibilities exist on all streams but, owing to the meagre data available, it is not possible to make an estimate of the total resources, and it is proposed to indicate in general only their extent, based on information secured by exploratory surveys.

From Great Slave lake to the Arctic ocean Mackenzie river has a total descent of 480 feet, but there are no waterfalls or rapids sufficient to cause serious obstruction to navigation. No natural power sites exist, but, should the necessity arise, low head developments would probably be obtainable. On the Great Bear river and other tributaries of the Mackenzie there are undoubtedly opportunities for the development of power.

Water-powers of considerable magnitude are indicated by the physical features of a number of the rivers entering Great Slave lake, particularly at the east end where the lake cuts deeply into the elevated Laurentian plateau. The Lockhart river gathers its waters from a chain of large lakes and before entering the east end of Great Slave lake has a descent of 700 feet in a distance of 25 miles. The power possibilities are tentatively estimated at 121,000 horse-power under conditions of ordinary minimum flow or 290,000 ordinarily available for 6 months of the year. The Taltson-Tazin River system, which enters Great Slave lake from the south, has numerous rapids and falls which offer power possibilities tentatively estimated to total from 88,000 to 210,000 horse-power under the two conditions of flow already mentioned. The Snowdrift river, also to the south of the lake, has a descent of 500 feet in 6 miles, offering power possibilities of from 20,000 to 49,000 horse-power.

The Hay river enters Great Slave lake from the southwest, and about 44 miles from its mouth two abrupt falls are situated, Alexandra falls, offering a concentration of 140 feet, and Louise falls, one of 52 feet. Tentative estimates of the combined capacity of these two sites indicate figures of from 27,000 to 82,000 horse-power. A reconnaissance survey was made of these powers by engineers of the Dominion Water Power and Reclamation Service in 1921.

Power possibilities of lesser magnitude are to be found also on the Yellowknife and other smaller streams tributary to the lake.

In addition, mention should be made of the large powers on the Slave river at Fort Smith rapids, where two concentrations have been estimated as capable of producing a total of from 222,000 to 506,000 horse-power. Except for the lower pitch, these rapids are situated in the province of Alberta but their development would make power readily available for use in the Northwest Territories.

Altogether the tributaries of Great Slave lake, including the Slave river, have water-powers tentatively estimated as totalling about 500,000 horse-power under conditions of ordinary minimum flow or over 1,100,000 for six months of the year. These estimates may, of course, be considerably modified when reliable records of stream flow become available.

East of the Arctic-Hudson Bay divide, the Thelon, Dubawnt and Kazan rivers drain a large territory and discharge into Chesterfield inlet. Rapids

* Prepared by Dominion Water Power and Reclamation Service, Dept. of the Interior.

and falls are indicated along their courses by explorers who have travelled these rivers but information is insufficient to make even a tentative estimate of their water-power possibilities. The same applies to Coppermine, Back and other rivers which flow northerly to the Arctic ocean to the east of the Mackenzie River system. However, should a market develop for power in these regions, there are undoubtedly many opportunities for developments to supply the needs which may arise.

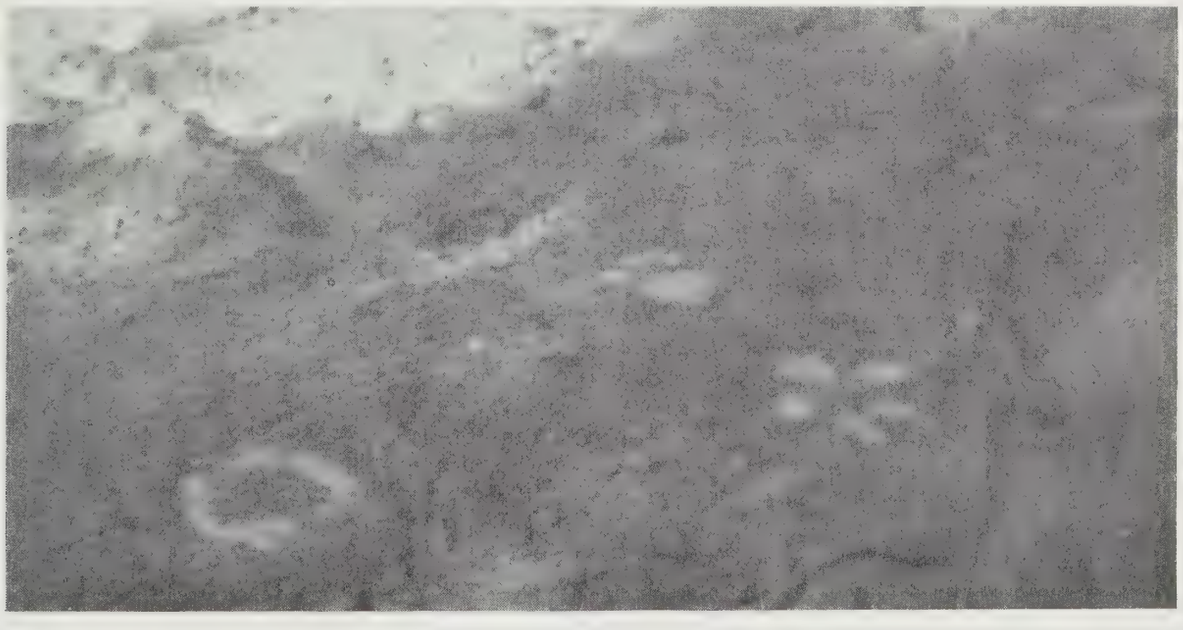
MINERALS AND MINING DEVELOPMENT

Comparatively little is known of the mineral resource of Mackenzie District but what information has been disclosed suggests that they are both extensive and varied. This view is strengthened by the fact that from similar geological formations elsewhere in Canada great mineral wealth is being recovered.

GEOLOGICAL FORMATIONS

Three of these major geological divisions cover Mackenzie District. They are the Precambrian or Laurentian, the Great Plains and the Cordilleran. The Precambrian, extending westward from Hudson bay, occupies the east part of Mackenzie as far as a line passing through the middle of Great Slave and Great Bear lakes. About 150,000 square miles of the District are included in this division. A spear or an off-shoot of the Great Plains region of Western Canada then projects northerly along the Mackenzie valley to the Arctic coast. Its width varies from 200 to 400 miles. About half of Mackenzie District is in this division. The western border of the District, comprising about 100,000 square miles, comes within the boundaries of the Cordilleran or mountainous region of Western Canada.

The Canadian Precambrian already has given evidence of being one of the world's greatest mineral producing areas. In it are found the Sudbury



FOOTPRINTS OF WILD ANIMALS

Picture taken in Wood Buffalo Park, showing footprints of each of three large wild animals, buffalo left, bear centre and wolf right.

nickel-copper camps that are the source of 90 per cent of the world's nickel supply; the Cobalt and other Ontario silver fields that have yielded over 400,000,000 ounces of that precious metal; the Porcupine, Kirkland Lake and Rouyn gold and copper-zinc-gold fields in which the famous Hollinger mine, one of the world's largest gold producers, is located; the tremendous copper-zinc ore bodies of Flin Flon and Sherritt-Gordon in northern Manitoba; the massive bodies of iron-bearing ore on the Belcher islands in Hudson bay; the promising Chibougamau Lake district of northern Quebec: the Red, Narrow and Woman Lakes areas of northern Ontario; the Central Manitoba Mining area, the gold-bearing areas of Amisk lake in northern Saskatchewan and Elbow and Wekusko lakes in northern Manitoba; and many other active or highly promising mineralized areas.

The Precambrian formation is known to contain also occurrences of apatite, corundum, feldspar, graphite, gypsum, kaolin, molybdenite, talc, and the rare metals of the platinum group. It therefore seems perfectly logical to expect that the 150,000 square miles of this formation extending into Mackenzie District will carry at least some continuation of the mineralized areas so widely distributed elsewhere. The existence of certain deposits has been known for some time and that of others is confidently expected.

The Great Plains region is the source of vast quantities of non-metallic wealth. Coal, oil, gas, salt and gypsum underlie extensive areas in the Prairie Provinces, particularly in Alberta, and are known to occur here and there in Mackenzie.

The Cordilleran region is the storehouse of a wide array of metallic and non-metallic deposits. British Columbia and the Yukon Territory both lie in this region and mining has been a major industry of each since pioneer days. That part of Mackenzie falling within this geological division is not definitely known to share in its general mining wealth but, as practically no systematic search has been made, its possibilities cannot be stated with any degree of certainty.

EARLY DISCOVERIES AND INVESTIGATIONS

Earliest reports of the presence of minerals in Mackenzie District were made by Indians who visited the Hudson's Bay Company's post at Churchill to trade in furs and who exhibited articles made of native copper. They told of a river where this metal was obtainable and Samuel Hearne's journey, of which mention has been made, verified their statements. The river was named fittingly the Coppermine. The Yellowknife Indians who inhabit the regions between Great Slave lake and this river were so named because of knives made of native copper found in their possession by early traders. The Copper Eskimos of Coronation gulf were likewise so named because of their use of native copper articles.

Before the close of the eighteenth century coal, also, had been discovered in Mackenzie District. When Alexander Mackenzie returned to Chipewyan from his voyage of discovery in 1789 down the great waterways of the North, he reported the presence of burning beds of coal on the banks of Mackenzie river near the present site of Norman.

The first scientific study of the geology or mineral resources of the district was made by John Richardson, M.D., who was associated with

Sir John Franklin in his overland expeditions to the Arctic coast. Richardson described certain mineralized areas adjacent to Great Slave lake and in the valley of Coppermine river and recorded the observation of copper in several forms along the northern part of the Coppermine valley.

Traders, missionaries, police, travellers and Indians, from time to time, reported indications of mineral occurrences, particularly of oil seepages on Mackenzie river. For over a hundred years the Hudson's Bay Company secured a local supply of salt from beds that crystallized at the foot of a brine spring about 25 miles west of Fort Smith. Salt river, flowing by these springs and joining the Slave a few miles below this post, is so named because of the saline taste of its waters. Limestone has been burned for many years in the vicinity of Good Hope and the neat whitewashed buildings there bear testimony to the liberal use of its products.

Earliest records of prospecting date back to 1898 when certain parties of Klondike gold seekers, who were attempting to reach the Yukon by way of the Liard or the Mackenzie river, spent some time during enforced delays in searching for minerals in the vicinity of their camps. No particularly startling discoveries were made and for many years no attempts were made to follow up such indications as were observed. But there prevailed persistent rumours of placer gold and galena having been found on the Liard or its tributaries, of copper north of Great Slave lake, of gold and silver at the east end of the lake, and of lead and zinc along its southwest shores.

During 1914 some petroleum and gas claims were staked at Windy Point, on the north shore of Great Slave lake, and on the right bank of Mackenzie river about 45 miles below Norman. Oil seepages had been observed at both locations over a long period of years. The outbreak of the Great War practically halted prospecting activities in all parts of the District. During its continuation very little active field work was done, other than the staking of additional claims.

OIL STRIKE OF 1920

Business-like prospecting got under way in 1919 when the Imperial Oil Company sent two drilling crews into Mackenzie District to test for oil on claims held at Windy Point and below Norman. The transporting of the heavy machinery and equipment required, and of stores, provisions and supplies for the housing and maintenance of the men who were to be kept on the ground during the full year, was a huge undertaking. The Peace River route was followed and it was necessary to move the whole outfit across the 4-mile portage at Vermilion chutes and the 16-mile portage from Fitzgerald to Fort Smith. Special scows and motor boats were constructed to augment the river steamboat service and tractors were introduced on the portages. The work of getting the material delivered was carried through with despatch considering the pioneer condition of transportation facilities.

During the same year the Aurous Gold Mining Company equipped and despatched a party to commence work on its quartz claims on Wilson island. Unfortunately the engineer in charge of the party was accidentally drowned and progress was considerably hampered as a result.

Up to the year 1920 there was very little public interest shown in Mackenzie District or its mineral possibilities. In that year the District came into the limelight through the striking of oil by the Imperial Oil crew operating below Norman. News that a gusher had been struck was brought out to Edmonton early in the fall and flashed from there over the world. As usual in such instances, exaggerated reports were circulated, but a genuine discovery actually had been made.

OIL WELL NEAR NORMAN

Several wells were drilled in the Norman district a few years ago with varying success.

At a depth of 85 feet in this well oil began to seep into the hole and from there down the seepage increased. At a depth of 783 feet, on August 24, the well gushed a 6-inch stream of oil to a height of 75 feet above the derrick floor for about 10 minutes, after which it was capped.

The immediate result of this discovery of oil was the creating of a temporary boom in oil locations and an impending rush to the District by the usual class of adventurers. The lateness of the season and the difficulties and expenses involved in reaching the field held all but a few hardy prospectors back till the following spring. By that time it was pretty well realized that heavy initial expenditures and long waits for returns would be the lot of most who sought their fortunes in these oil fields and the threatened stampede dwindled to a comparatively mild rush of a few hundred men, most of whom were employees of half a dozen companies.

The District received much publicity as a result of the original discovery and a few prospectors turned their attention to it in the hope of locating gold or other minerals that might yield quicker returns. Hunters, trappers, tourists and other classes of people were also attracted to it. The demand for general information and the necessity of providing for local

administration led the Dominion Government to take steps for its organization and development, particulars of which have been mentioned on other pages.

The most important of the Government's activities, from the standpoint of prospectors and miners, was the making of an independent Mining Recording Division of the District with a Recorder's Office at Fort Smith and sub-offices at Simpson, Norman and, for a time, Resolution. Prior to this the mining records of the District were kept at Edmonton with only sub-offices at Fort Smith and Simpson. Another boon that followed was the providing of more accurate geological and topographical maps and reports as the result of extensive field work carried out in 1921 and succeeding years by parties of the Geological Survey of Canada and the Topographical Survey of the Department of the Interior.

LATER OIL DEVELOPMENTS

Without further details the prospecting for oil may be summed up in a few words. The Imperial Oil Company drilled two additional holes during 1921 in the vicinity of its Discovery well. One on Bear island was bored to a depth of 2,080 feet. A showing of oil was encountered at 1,945 feet and further indications of oil, as well as of gas, at 1,975 feet. Below that, however, a quantity of salt water was encountered. The other, on the west bank, was bored to a depth of 3,057 feet in limestone, but without a satisfactory showing. During the same year a hole was drilled to a depth of 1,806 feet at Windy point on the north shore of Great Slave lake but it proved dry and was abandoned.

In 1922 Discovery well was deepened to 951 feet when a flow of 60 to 70 barrels per day was recorded. A fourth hole was commenced at a point up-stream nearly as far as Norman, but owing to lack of drillers was sunk to a depth of 500 feet only, after which the well was capped again.

The Fort Norman Oil Company secured locations on the right bank of Mackenzie river about 6 miles up-stream from the Imperial Oil Company's Discovery well and in 1921 drilled a well to a depth of 1,512 feet when work was discontinued owing to shortage of equipment. A showing of oil was met at 305 feet and a flow of gas estimated at 300,000 cubic feet at 385 to 500 feet. After suspension of operations the well was capped.

The White Beaver Oil Company, during the winter of 1921-22, took up a number of oil and gas holdings on Hay river, about 16 miles above its mouth on the south shore of Great Slave lake. During 1922 a hole was drilled to a depth of 712 feet and discontinued when a flow of 360 gallons per minute of salt water was encountered. The well was plugged and abandoned.

For the very limited amount of drilling that has been done and the large area over which this was scattered the results may be considered as very encouraging. Geologists and oil experts feel that oil in commercial quantities and of a high grade will be found when under the combined urge of better transportation facilities and the development of markets for the oil and its products more detailed and extended search for productive horizons is instituted.

PINE POINT LEAD-ZINC DEPOSITS

About 32 miles southwest of Resolution and 8 miles south of Pine point, which is a well-defined topographical feature on the south shore of Great Slave lake, deposits of lead-zinc ore are being actively prospected by several prospecting companies. Development work includes the construction of a wharf at Pine point, the building of a 16-mile motor road from the wharf to the claims and the erection of a permanent camp composed of substantial log buildings. Boats, tractors and aeroplanes are used for transportation purposes.

A number of test pits were opened up and a shaft had been sunk to a depth of 55 feet by August 1, 1929. Arrangements for churn drilling were under way at that date. In all, five deposits of lead-zinc ore have been found already.

OUTCROPS OF LEAD-ZINC ORE NEAR GREAT SLAVE LAKE

Development work is being prosecuted on bodies of lead-zinc ore that outcrop near Pine Point, on Great Slave lake.

Dr. J. Mackintosh Bell, who is identified with the developing companies, states that the quantity of ore would appear to be considerable, but it remains to be proved, by the exploration now in progress, whether the amount is sufficient to warrant early intensive development as a mining enterprise. The quality of the ore is said by him to be generally good, in places unusually so.

This location is favourably situated in respect to transportation facilities and to the utilization of hydro-electric power that can be developed at waterfalls on Hay and Taltson rivers. Other prospectors have entered the field and staked additional claims. Much interest is being exhibited in these development undertakings and it is hoped one or more producing mines will result.

OTHER ACTIVITIES

Prospectors who were attracted to the country by the publicity resulting from the discovery of oil, staked a number of claims on tributaries of the Liard and Mackenzie rivers, particularly on the South and North Nahanni rivers and their tributaries. Traces of coarse placer gold were found but to date no paying claims are known. Some samples of rock carrying values in silver and lead were brought out from these regions. A few quartz claims were staked but no definite information as to the extent or value of any possible mineralized areas was made public and the claims were allowed to lapse.

In 1916 a number of quartz claims were staked on Wilson island in Great Slave lake, where a ledge of gold-bearing quartz had been found. More staking was done in 1918 and the holdings have been acquired and consolidated by the Aurous Gold Mining Company. This company has transported considerable machinery and equipment as far as Fort Smith and the amount of work done to date would indicate that its holdings on Wilson island would constitute a good prospect.

During the year 1928 Northern Aerial Minerals Exploration Limited transported a party of prospectors by plane into the Flat Creek district, which is tributary to the South Nahanni river, to investigate the persistent reports of coarse gold having been found there. Other aerial prospecting was carried on by the same company in the area to the northeast of Fitzgerald.

During 1929 Dominion Explorers Limited took a party of experienced prospectors in charge of H. M. Eakin by planes into areas adjacent to Arctic Red and Peel rivers and the Mackenzie delta to conduct preliminary examinations of mineral possibilities. Another party was taken into the South Nahanni country to investigate some of the galena claims that were staked in 1922. Still other prospectors were located on Great Bear lake for a time. Bases were established from which planes might be operated during 1930 to carry prospectors into any part of Mackenzie District.

Northern Aerial Minerals Exploration Limited continued prospecting activities in Mackenzie District during 1929. The Consolidated Mining and Smelting Company also made use of aeroplanes in connection with prospecting activities in Mackenzie District.

The occurrence of coal along the Mackenzie river in the vicinity of Norman has been mentioned. Other areas of coal are known to outcrop or to lie just beneath the surface of the ground along the Arctic coast, particularly in the vicinity of Kittigazuit and of cape Parry. While this coal is a lignite, its value as a local fuel is extremely important, particularly on the coast where no other wood than drift material is available.

A promising area at the east end of Great Slave lake is receiving considerable attention at present. It is possible that the mineralized area at Stony Rapids, east of lake Athabaska in northern Saskatchewan, may be found to extend into the southeast part of Mackenzie District. In fact, the whole of Mackenzie District is an inviting field for the prospector.

CANCELLATION OF COPPERMINE RESERVATION

By an Order in Council of December 21st, 1918, a certain area in the Northwest Territories in the vicinity of the Coppermine river was set apart as a reserve under the quartz and placer regulations. This was done in order that the deposit of native copper reported to occur in that region might be thoroughly examined. The area affected is described as lying north of the 65th parallel of North latitude and between the 105th and 116th degrees of West longitude, comprising the islands in and the territory adjacent to Coronation gulf and Bathurst inlet. It covers not only a large block of the mainland but parts of Victoria, Melville, Banks and other islands, amounting altogether to about 145,000 square miles.

While the investigation which has since been conducted, and which, owing to the remoteness and extent of the territory, has not been as thorough as originally contemplated, has disclosed the presence of dislocated fragments of native copper and considerable deposits of comparatively low-grade ore, exploration on an extensive scale would appear to be necessary to determine whether or not these deposits are sufficiently valuable to admit of profitable operation.

The improvement which has recently taken place in facilities for transportation to and communication with that remote region, has now rendered it possible for a more detailed investigation of the entire district to be conducted through private enterprise, for which reason, authority was obtained by Order in Council dated the 14th January, 1930, for the withdrawal of this reservation as at the 1st July, 1930. Disposal of mining rights subsequent to the latter date is made under the mining regulations in force in the Northwest Territories.

The geology of part of the area included in this mineral reserve was investigated by J. J. O'Neill who was attached to the southern party of the Canadian Arctic Expedition of 1913-18. His report (Part A, Volume XI, Canadian Arctic Expedition 1913-18) was published in 1924 and is to be obtained from the Department of Mines, Ottawa. One chapter is devoted to *Deposits of Native Copper in Arctic Canada* and a great deal of information respecting their origin, occurrences and values is given.

Further investigations of the Coppermine region were made during 1929 by Major L. T. Burwash, M.E., of the North West Territories and Yukon Branch. His report will be made public in due course.

INVESTIGATIONS BY THE DEPARTMENT OF MINES

The Department of Mines has played an important role in the exploratory investigations of Mackenzie District. Before the organization of this Department in 1907, the Geological Survey of Canada, which now constitutes one of its major branches and which was called into existence as

early as 1842 for the purpose of studying the geology and natural history of Canada, had sent field parties into the areas now comprising the Yukon Territory and Mackenzie District. Dr. George M. Dawson, on the Yukon side of the mountains, and R. G. McConnell, on the Mackenzie side, preceded the rush of Klondike gold seekers that surged North in 1898 and succeeding years.

EARLY EXPLORATIONS

The early explorations of the Geological Survey in Mackenzie District included the work of six prominent Canadian geologists, R. G. McConnell, Dr. Robert Bell, J. Mackintosh Bell, J. B. Tyrrell, Joseph Keele and (Dr.) Charles Camsell (now Deputy Minister of the Department of Mines).

McConnell, in 1887, and 1888, examined the country contiguous to the Slave, Liard and Mackenzie rivers and made a series of maps of these waterways. Dr. Robert Bell, in 1899, made investigations of the country adjacent to Great Slave lake. J. Mackintosh Bell, in 1900, reported on the topography and geology of Great Bear lake and of a chain of lakes and streams between that lake and Great Slave lake. J. B. Tyrrell, in 1900, explored the country east of Great Slave lake along the route to Chesterfield inlet, supplementing his explorations of the Dubawnt River country in the southeast part of Mackenzie District made in 1893. Joseph Keele, in 1907-08, examined the Gravel River valley and Doctor Camsell covered various parts of the District during the period from 1902 to 1916 including an exploration of the Tazin and Taltson rivers in 1914.

THE CANADIAN ARCTIC EXPEDITION OF 1913-18

The technical personnel of the southern party of the Canadian Arctic Expedition of 1913-18 was comprised almost entirely of officers of the Department of Mines. Dr. R. M. Anderson, then Zoologist of the Geological Survey and now Chief of the Biological Division of the National Museum of Canada, which also comes under the jurisdiction of the Department of Mines, was the leader of this party. The geological, geographical and topographical work of the party was in charge of J. J. O'Neill, K. C. Chipman and J. R. Cox, all permanent members of the Geological Survey staff.

Two anthropologists accompanied the expedition for the purpose of conducting research work among the Copper Eskimos of Coronation gulf,—Henri Beuchat of France and D. Jenness, then Ethnologist of the Geological Survey, now Chief of the Division of Anthropology of the National Museum of Canada. M. Beuchat lost his life following the wreck of the expedition's largest vessel, the *Karluk,* and the whole of this part of the work devolved upon Mr. Jenness.

The only technical officer of the southern party who was not connected with the Department of Mines was F. Johansen who was employed as Marine Biologist by the Department of Naval Service.

The northern party, under the direct leadership of V. Stefansson, remained in the field till the fall of 1918 but the southern party completed the work originally outlined and returned to Ottawa in the fall of 1916. Owing to reverses experienced on the outward journey, the work did not

get under way in Canadian territory till the year 1914 but in the three years spent along the Arctic coast of Mackenzie district a vast amount of scientific information was secured.

Headquarters were established at Bernard Harbour and the mainland coast was surveyed and examined from the Yukon-Alaska boundary on the west to Bathurst inlet on the east. The work was extended also to include much of the south shore of Victoria island, numerous smaller islands and the lower section of the Coppermine River country.

In 1917 an Arctic Biological Committee was appointed jointly by the Department of Naval Service and the Department of Mines to supervise the marshalling of scientific data and the publishing of reports. Doctor Anderson was named as general editor of the reports. When the Department of Naval Service was amalgamated in 1922 with the Department of Militia and Defence its interests in connection with this work were transferred to the Department of Marine and Fisheries.

LATER INVESTIGATIONS

Later investigations in Mackenzie District, and particularly following the oil development of 1920, have been made by members of the Geological Survey. Studies in stratigraphic geology were made in the Mackenzie valley and about the west end of Great Slave lake. Oil-bearing formations were given considerable attention as well as the economic geology of the district at large. Departmental geologists who spent one or more seasons in the Mackenzie field were Kindle, Cameron, Dowling, Hume, Williams, Whittaker and Stackwell. Indian ethnology has very recently been studied in the vicinity of Arctic Red River by Osgoode.

Reports on the work of these parties that operated in Mackenzie District have been published by the Department of Mines, or are in course of preparation. A number of useful maps have been issued also, including a general geological map of Mackenzie District on a scale of 50 miles to an inch, a map of the Arctic coast from the Yukon-Alaska boundary to Bathurst inlet, and a number of maps of limited areas on larger scales.

Applications for copies of reports or maps of a geological nature should be made to the Director, Geological Survey of Canada, Department of Mines, Ottawa. The Director, National Museum of Canada, Department of Mines, Ottawa, should be addressed for reports pertaining to biology or ethnology.

WOOD BUFFALO PARK

The story of the American bison and its tragic fate is well known. Once roaming in countless millions over the plains of North America from the gulf of Mexico to Great Slave lake and from the Rocky mountains to the Alleghanies, this monarch of big game animals, erroneously but better known as the buffalo, was all but annihilated by the vanguard of agricultural settlement that usurped its range. In fact, for many years, it was generally conceded that, save for small herds in captivity whose permanency was doubtful, its fate was sealed. It was at this stage that the Dominion Government stepped in and purchased the largest remaining herd of semi-wild animals and established it at Wainwright, Alberta, as noted below.

Later, from the Northwest Territories came encouraging news. A remnant herd had found safe refuge in a favourable retreat on its border and its members were thriving in a free state. The Dominion Government took immediate steps to ensure their protection and to ascertain their numbers and the extent and nature of their range.

NUMBER AND RANGE OF WILD BISON

From investigations conducted during the years 1920-21-22, it was estimated that there were about 1,500 animals, though earlier reports had suggested from 250 to 500 only. The range was found to be along the west side of Slave river from Peace river to within a few miles of Great Slave lake, and westward to Jackfish river, the Caribou hills and Little Buffalo river. It was thus partly in Alberta and partly in Mackenzie District.

Part of this range is heavily forested and there are numerous sandy ridges carrying lighter woods of poplar and jack pine so that there is ample shelter during cold weather and shade in the summer time. The heavier woods are interspersed with numerous open or park-like spaces, and many muskegs and small lakes and sloughs are found in the valleys. Coarse grasses flourish in abundance on the low lying lands and other native grasses, pea vines, mosses and herbage on the uplands.

RANGERS' CABINS, WOOD BUFFALO PARK

A very efficient warden service is maintained in Wood Buffalo Park by the North West Territories and Yukon organization.

The shelter, vegetation and water supply combine to make satisfactory feeding grounds for large herds of hardy grazing animals. In addition to these requisites there are a number of salt-licks and saline springs in the range which the buffalo find much to their liking. The sand ridges are an advantage also. During the fly season the harassed animals resort thereto and find a certain measure of relief by wallowing in the loose soil or by pawing it smartly against their bodies to drive away the insects.

These northern animals are the equal or superiors in appearance, size and vitality of any previously found on the more southerly plains. Males weighing a ton are quite common and specimens weighing 2,500 pounds have been taken for scientific purposes.

With a view to the preservation in its wild state of this surviving buffalo herd, the Dominion Government, in 1922, set aside its range, comprising 10,500 square miles, as a national park to be known as Wood Buffalo Park. The District Agent of the Department of the Interior, stationed at Fort Smith, was made Superintendent of the park and a warden service was established.

Later it was found that many buffalo were crossing Peace river to winter on the luxuriant vegetation of the low lands about lake Claire and the west end of lake Athabaska. Satisfactory arrangements having been concluded with the province of Alberta, in which the southerly part of the park lies, the boundaries of the park were extended in 1926 to include these feeding grounds. The total area of Wood Buffalo Park is now 17,300 square miles, of which 3,625 square miles are in Mackenzie District. It is the largest big game preserve in America.

TRANSFER OF BISON FROM WAINWRIGHT

Meanwhile the Government's buffalo herd in the Wainwright enclosure of central Alberta, inaugurated with a herd of 709 animals purchased in 1907 from Michael Pablo of Montana, had increased to numbers beyond the resources of that range. It was decided to try the experiment of transporting a number of the younger animals to Wood Buffalo Park and liberating them with their wild kin. Cars were specially fitted up for the rail haul to Waterways and scows that could be handled by steamboats for the journey by water down the Athabaska and Slave rivers.

The novel undertaking of giving this former monarch of the plains his freedom again was begun in 1925, and was continued for four years. During that time 6,673 buffaloes were liberated in Wood Buffalo Park. The number was made up of 4,826 yearlings, 1,515 two-year olds and 332 three-year olds, the majority of which were females. Advice from the Superintendent is to the effect that the new-comers have been assimilated satisfactorily by the native herd in the southern portion of the range. The animals are healthy and from the number of calves with the herds it is evident they are increasing steadily. A recent estimate places the total number in the park at 10,000 animals.

The warden service has been increased to comprise twelve skilled rangers under the direction of the Superintendent. Cabins have been built at strategic and convenient points throughout the park and the rangers are distributed over the whole area, making their headquarters at these cabins. Roads, trails and telephone lines have been constructed to connect the cabins with the Superintendent's office at Fort Smith and with each other.

THE BARREN-GROUND CARIBOU

The barren-ground caribou (*Rangifer arcticus*) is the most prolific and economically valuable big game animal of the Northwest Territories. In average size, it is considerably smaller than the woodland caribou and slightly smaller than the domestic reindeer, to both of which it is closely related in general appearance and habits. It appears probable that there are several variants or subspecies of the main type.

The food of the barren-ground caribou consists of a wide range of grasses, sedges, lichens and mosses. The tender shoots of willows and dwarf birches are much relished also. The ability of this animal to thrive on the moss that covers a large portion of the Northern Plains, especially during winter time when grasses are not so easily recovered from beneath the mantle of snow, enables it to remain permanently in these northern regions. As a rule the lichens and mosses constitute its winter fodder while in the summer time it pastures on the many varieties of Arctic herbage. Its chief economic value at present is as a source of food and clothing for the natives.

RANGE AND NUMBERS

Explorers, travellers and scientists who have given us our store of information concerning these animals are Hearne, Mackenzie, Franklin, Back, Richardson (who gave them the name of *Rangifer arcticus*), Hanbury, Pike, Preble, J. B. and J. W. Tyrrell, Seton and others. Estimates as to the number of caribou vary greatly. Some observers estimated the total in millions. On the other hand the Royal Commission on the Reindeer and Musk-ox (1919) which collected all possible information quotes only the count or calculation made by observers at one time and place. The one point upon which all are agreed, however, is that there has been a serious reduction in the numbers of caribou in the past two decades.

Second only in interest to its great numbers are its migrations. Each spring the whole body, comprising unknown millions, surges northerly to over-run the Arctic coast regions and the Arctic islands and each fall returns to winter along the fringe of the sub-Arctic forest zone. There is considerable overlapping of summer and winter ranges but two distinct migrations a year, one northerly and the other southerly, have been observed since white explorers first met this animal and have been known to natives longer than they can tell.

For many years there was little evidence of any alarming change in the situation but from about 1915 it became evident that the caribou were decreasing in numbers and that their migrations were being restricted or diverted into unknown channels. It has been ascertained, also, that the caribou of Ellesmere and other far northern islands and of Baffin and Southampton islands are permanent residents and do not intermingle with the mainland body. Since the native population of the Northwest Territories is largely dependent on this animal as a source of both food supply and clothing, it is of the utmost economic importance that its permanency be maintained.

INVESTIGATIONS BY W. H. B. HOARE

In 1924 the Department of the Interior, through the North West Territories and Yukon Branch, appointed W. H. B. Hoare, who had spent some years among the Eskimos of the Mackenzie Delta region, a Special Investigator to (1) make a careful investigation into the needs and food supply of the natives, with special reference to their effect on caribou, (2) investigate the migrational routes traversed by the caribou, the nature of their food and the duration of time for its reproduction after being closely grazed, and (3) educate the natives in the conservation and protection of caribou, so as to prevent wanton slaughter and waste, such education to also extend to fur bearers and game generally.

During the years 1924, 1925 and 1926 Hoare travelled extensively along the Arctic Coast regions from the Mackenzie river eastward to Western river and as far inland as the north arm of Great Slave lake. His report throws much light on the present movements of the caribou, showing the probable cause of diversions from their former routes of migration and enlarging on the disastrous results that follow. It is evident that the caribou have suffered severe inroads into their numbers during recent years and that their natural habitat has been reduced in area. To a certain extent such results are inevitable, as wild life almost invariably gives way before the advance of settlement. In the case of the caribou there appears to have been unnecessary destruction and the Department of the Interior has taken active steps to prevent it.

It would appear, from the reports of Hoare and others, that two principal causes were responsible for the present situation. The first was the introduction of high-powered rifles and unlimited ammunition, thus enabling the natives and others to slaughter the caribou in great numbers. As they had no idea of conservation, they killed in excess of their requirements and unless they had been checked would, in time, doubtless have exterminated the species. The second was the establishment of a chain of trading posts along the Arctic coast from the Mackenzie delta to King William island. The smoke, noise and dog menace characteristic of these posts, as well as the actual hunting prosecuted from them, combined to turn the timid caribou aside from their usual routes of migration to the north.

Formerly it was observed that the northward migration from the wintering grounds began about March, being headed by the cows and yearlings. Grazing as they travelled slowly along, they reached the Arctic coast about the latter part of April. Crossing rapidly on the sea ice which remains firm in the straits until after this date, they dispersed over the Arctic islands where their young were born during the month of June.

With the approach of winter the cows and calves started to move south, recrossing to the mainland as soon as the straits were frozen over again, which is usually in November. On the mainland they were joined by the bulls, few of which went farther north, and the main band migrated south to the wintering ground on the edge of the forests.

Comparatively few caribou now cross from the mainland to the Arctic islands. The chain of posts along the coast causes them to turn aside,

mostly to the east, and circle back on the mainland. Here the young are now born and the natural conditions for their welfare are not so favourable as on the islands. Wolves, birds of prey and insect pests exact a heavier toll. Climatic conditions may not be as favourable either, nor the feeding grounds as suitable.

SCENES AT RESOLUTION, GREAT SLAVE LAKE

Top, dog team hauling baggage to steamboat landing; bottom, encampment of Indians who have assembled to receive their treaty payments.

Changed conditions of the Eskimo's mode of life have reacted against the caribou. Formerly he depended on his own resources for his food and clothing and spent more time in sealing and fishing. Now he has become a trapper as the demand of the fur trade has created a market for white fox skins. When the trapping season is over he organizes drives for caribou. With the lighter and more modern equipment that he secures from the trader he is enabled to penetrate farther inland and so molests the animal in its former safe retreats.

CONSERVATION MEASURES

Without protection it would be only a matter of time till the caribou suffered the same fate as the American bison that once was as plentiful on the western plains as the caribou is on the northern ones. As already stated however, the Dominion Government has taken active steps to prevent such a disaster. The establishing of the Thelon game sanctuary, which

is described in the following section, is one of the most important. In it both hunting and trapping are forbidden and this applies equally to natives and whites. It is hoped the caribou will find a safe refuge there for the rearing of their young if they do not return to their former grounds on the Arctic islands. Other measures include the education of the native concerning the conservation of wild life resources, the compulsory enforcement of the game laws of the Territories, the restocking of deserted feeding grounds by the closely related reindeer, encouragement in the killing of wolves and other predatory animals, and eagles, that prey especially on the young, the setting aside of large game preserves in which white trappers are debarred and the removal of posts from the vicinity of favourite crossings.

THELON GAME SANCTUARY AND THE MUSK-OX

It has been mentioned that one of the measures adopted by the Government with a view to the conservation of the barren-ground caribou was the establishment of the Thelon game sanctuary. The preservation of the musk-ox was an important factor also in the selection of this particular area, for information was obtained that in this vicinity are to be found the largest known herds of this distinctive Arctic animal surviving on the mainland.

THE SANCTUARY

The Thelon game sanctuary was established by an Order in Council of June 15, 1927, becoming effective on September 1 of the same year. It embraces an area of approximately 15,000 square miles in the interior of the mainland of the Northwest Territories. The greater portion of the area lies in Mackenzie District but its easterly extremity lies in Keewatin District. In general terms it may be said to include the drainage basin of Thelon river north of the 63rd parallel of North latitude, and of its principal tributary, the Hanbury.

The headwaters of Hanbury river comprise a chain of lakes on the high rugged plateau to the northeast of Great Slave lake. A poorly defined height of land barely separates these lakes from a parallel chain of larger lakes drained by the Lockhart river into McLeod bay and Great Slave lake. This latter chain has been made the western boundary of the sanctuary. It includes Artillery, Ptarmigan and Clinton-Colden lakes.

The initial outlet of Thelon river is Beverly lake, into which the large Dubawnt river also discharges. Dubawnt river rises near the northeast extremity of lake Athabaska and flows northeasterly on a course roughly parallelling and east of the Thelon. Beverly lake is a little north of latitude 64° 30′ North and about 25 to 30 miles east of the boundary between Mackenzie and Keewatin Districts. It marks the easterly extremity of the sanctuary.

From the confluence of the Thelon and Dubawnt rivers there is a remarkably direct waterway to Hudson bay. It comprises a chain of large lakes with short connecting sections of river, usually referred to as the Lower Thelon, and a deep inlet from the sea. From west to east are

Beverly, Aberdeen, Schultz and Baker lakes and Chesterfield inlet. There is thus a fairly direct route by natural waterways from Reliance, on the east end of Great Slave lake, to Chesterfield, on Hudson bay.

As both extremities of this route are made up of large bodies of water that act as barriers to the free movement of large game animals, the mid-section, included in the sanctuary, assumes the nature of a wide gap or gateway through which their movements are concentrated. The barren-ground caribou, in their migration from north to south and south to north, have been known to cross the Thelon and Hanbury rivers in herds of almost inconceivable numbers and density. The sanctuary, therefore, is strategically located for purposes of studying their habits and movements.

THE MUSK-OX

The musk-ox (*Ovibos moschatus*), a distinctive Arctic animal, now unfortunately very rare, is found on the mainland in one or two localities difficult of access, and on some of the Arctic islands. Within comparatively recent times it ranged over the whole of the treeless areas from the mouth of the Mackenzie river to Churchill, as well as on many of the Arctic islands and parts of Greenland.

The musk-ox is one of the hardiest animals known, being able to thrive on the dwarf willows, saxifrages and grasses that flourish in favoured localities in these regions, pawing away the snow to get at them during the winter time. Unlike the barren-ground caribou, it does not migrate, other than retreating to sheltered regions during extremely cold weather, but prefers to remain in the same locality, grazing quietly like domestic cattle, and moving only as its pasturage becomes exhausted.

In size, the musk-ox is smaller than the domestic cow and larger than a sheep. An average-sized, full-grown male weighs 550 to 600 pounds. Its

MUSK-OXEN ON DEVON ISLAND

The musk-ox is a distinctive Arctic animal and, while comparatively scarce, is still found on certain parts of the mainland and on several of the Arctic islands.

great covering of long hair and its formidable horns give it a more imposing appearance than its actual size warrants, but it is quite agile and capable of defending itself against wolves. When alarmed a herd forms itself into a square, the males facing the enemy and fighting savagely with their effective horns. This trait, however, makes them an easy prey to hunters.

The flesh of the musk-ox is very nutritious and compares favourably with beef. Besides its long hair, the animal has a closer covering of wool, the full economic value of which has not yet been determined. This heavy coating of hair and wool, besides enabling the animal to maintain its body heat during winter, is thought to prove very effective in warding off the attacks of flies that cause the caribou great annoyance and injury during summer months.

It is claimed that the musk-ox can be domesticated readily. Since its natural habitat is in the North, its preservation there would constitute an asset which might be utilized in cases of emergency or to such extent as the surplus warranted, and in areas which could be put to no other economic uses.

So far as known at present this animal is found, in limited numbers, on the mainland along the Hanbury and Thelon rivers within the Thelon game sanctuary. A few stragglers are reported in other localities but their numbers, if any, must be few. The animal is found also on Melville, Banks, Devon, Axel Heiberg and Ellesmere islands but in small herds only.

As a preliminary step in the conservation of this valuable animal the Government has prohibited its killing or the trading in its hide. These restrictions apply to whites and natives alike and are rigidly enforced by the mounted police. In the meantime, investigations respecting its habitat and numbers are being carried on.

INVESTIGATIONS BY W. H. B. HOARE

Early in January 1928 the Department of the Interior despatched W. H. B. Hoare, Special Investigator for the North West Territories and Yukon Branch, to the sanctuary to investigate wild life conditions therein. He was accompanied from Fort Smith by Warden Knox of Wood Buffalo Park and the journey to the sanctuary was made by dog team by way of Great Slave lake. The summer of 1928, the succeeding winter and the summer of 1929 were spent in exploring parts of the area and in gathering information concerning the wild life therein. Mr. Hoare then travelled to Chesterfield where he met the Dominion Government's Arctic patrol steamer and returned by it to Ottawa. Warden Knox remained to guard the sanctuary till more permanent arrangements are perfected.

A full report is being prepared by Mr. Hoare. It will verify the presence of musk-oxen in the grassy valleys of Thelon river where food is abundant and shelter, in the fringe of woods that extends below the junction of the Hanbury, is convenient. Further information will be given also respecting the breeding grounds and migrations of caribou, the wolf menace and the nesting places of migratory game birds. Tentative proposals for the guarding of the area and the establishment of bases will be outlined.

As yet practically no white traders or trappers have established themselves in the area selected as the sanctuary so that there are no conflicting

interests to be dealt with. The Indians very rarely extend their hunting tours over its boundaries and only occasional parties of Eskimos visit the area. The excluding of both whites and natives will precipitate no hardships, but on the contrary it is hoped the benefits to be achieved will react to their advantage.

The organization of a permanent staff of resident wardens or guardians and the establishment of necessary headquarters and bases will be proceeded with at an early date.

INTRODUCTION OF REINDEER

It has been mentioned that during the past ten or fifteen years the barren-ground caribou has disappeared from many of its former feeding grounds, that its migrational routes have become deflected and uncertain, and that its numbers and range have been seriously reduced. With the welfare of the natives in view, the Dominion Government has devoted a great deal of attention to the preservation of native wild life and the introduction of animals of allied species that might be expected to thrive under northern conditions, for in these Arctic and sub-Arctic regions big game animals are an essential resource for the supplying of food and clothing.

RECOMMENDATIONS OF ROYAL COMMISSION

In 1919 a Royal Commission was appointed to investigate the possibilities of the reindeer and musk-ox industry in the Arctic and sub-Arctic regions of Canada. In its report issued in 1922 the Commission recommended, among other things: "That small experimental reindeer herds be established in a number of such localities as may, after searching Departmental investigation, be found most desirable in points of vegetation and otherwise; that an earnest effort be made to ascertain as soon and as closely as possible the numbers and movements of the barren-ground caribou, especially those on the mainland and on the islands adjacent thereto; that a comprehensive survey be made of the vegetation and other conditions having a bearing on the support of herbivorous animals in the interior area, with the object of securing information as to the comparative value of the various districts for grazing purposes; the extent to which these natural pasture lands are now being used by the caribou; the approximate numbers of additional caribou or reinder which might reasonably be expected to find sustenance in the different districts; that special attention be given to the enforcement of such regulations as will effectively prevent the wasteful or useless slaughter of the wild caribou, either by natives or others; and that an intelligent and systematic campaign be inaugurated, having for its objects the extermination of wolves, wolverines and such other animals as prey upon the caribou."

Acting on these recommendations the Dominion Government, through the North West Territories and Yukon Branch of the Department of the Interior, inaugurated an investigation of the barren-ground caribou as described in a preceding section. Steps were taken to educate the natives respecting the conservation of game, with particular reference to the caribou, and to enforce the observance of game regulations. The Thelon

game sanctuary was established as a retreat for caribou and musk-oxen. A campaign for the destruction of wolves was launched and experimental steps in the introduction of reindeer were taken.

It was finally decided that there was no apparent reason why reindeer should not thrive if introduced into certain parts of the Northwest Territories, especially in view of the success that had accompanied the United States Government's reindeer venture in Alaska. The scheme favoured by the Dominion Government was that of promoting a reindeer industry which the natives should develop themselves, rather than establishing a Government industry. Before launching into more active steps it was decided to have a thorough investigation made by a competent person who should report on the suitability of the areas in view as ranges and on the proposed undertaking in general.

The country between the Alaska-Yukon boundary on the west, the Coppermine river on the east, Great Bear lake on the south and the Arctic coast on the north was selected for examination. This area was formerly visited by large herds of caribou in their migration but during recent years it has been practically deserted by them.

Instructions were prepared for a general botanical reconnaissance with special reference to reindeer pasture and carrying capacity and for studies of other general conditions of importance to a future reindeer industry. Since in Alaska the reindeer industry has become such an outstanding success, it was decided that, previous to the field work in Canada, the investigator should, with the permission of the United States Government, spend a season in Alaska where an exhaustive study of the reindeer industry and its effect on the country and people would be made.

INVESTIGATIONS BY A. E. AND R. T. PORSILD

In April, 1926, A. E. Porsild, an experienced botanist, was appointed to conduct such an investigation with the assistance of his brother, Robert T. Porsild, both of whom had lived many years north of the Arctic circle and could speak the Eskimo language. The investigation occupied from May, 1926, to November, 1928, and thus included two winters and three summers in the field, during which time, not including steamboat and railway travelling, an aggregate of 15,000 miles was traversed by dog team, canoe, motor boat, pack dogs and snowshoes. Extensive biological collections were made whenever time and transportation permitted. The investigators returned with probably the largest botanical collection ever brought back from Arctic America, comprising about 15,000 herbarium specimens of vascular plants and nearly 5,000 specimens of cryptogams, as well as a small collection of zoological specimens and about 1,000 photographs.

In his report Mr. Porsild, after recording his investigations of reindeer herds in Alaska and narrating his travels in the North, described a number of particular grazing areas that he considered suitable as reindeer pasture. These are, (1) the coast of Mackenzie district and the Yukon Territory, including Herschel island, west of the Mackenzie river and east of the Yukon-Alaska boundary, (2) the Mackenzie delta and islands, (3) the Arctic coast and hinterland from Mackenzie river to cape Bathurst, (4) the plains north of Great Bear lake, (5) the Dease valley, and (6) the Dismal Lakes and Kendall River valleys.

In the first district he estimates that there are 640,000 acres of excellent spring, summer and fall grazing lands sufficient for 10,000 to 15,000 head of reindeer and that ample winter grazing is to be found in the upper parts of the valleys of the Firth, Babbage and Blow rivers that flow to the adjacent coast. This area is practically all in the Yukon Territory.

Of the second area Mr. Porsild says, in part:—

"The highest parts of the interior are covered by a hard and fairly dry type of tundra, very different from the low, wet tundra of western Alaska, and also from the low land north of the Eskimo lakes. Although not so rich in succulent grasses and herbs as the Alaska tundra, this type of pasture is nevertheless more valuable as summer pasture for reindeer, as it is not so susceptible to damage by the trampling of grazing herds. This pasture with a high percentage of palatable species can therefore be utilized more economically as it is not damaged much by close herding. Bordering the numerous lagoons and sheltered inlets, extensive meadows exist which carry a splendid crop of rather short but highly palatable grasses and sedges

"The majority of the islands in Mackenzie bay are of the Richards island type, but none of them compares with the latter in size. Although some patches of willows and browse occur in sheltered places, all the islands are rather deficient in lichen and winter forage, and herds must therefore be moved to the mainland after freeze-up in October and November. The rivers and channels do not prevent herds from crossing to the mainland but, in spite of this, these islands afford such splendid summer grazing that each of the larger ones constitutes an ideal, natural grazing unit to which the deer can be restricted by a minimum of herding. From a rough calculation partly based on the existing maps, the Mackenzie delta and the islands of Mackenzie bay aggregate about 2,500 square miles of grazeable land for all-year-round maintenance of reindeer herds and should thus provide ample room for about 30,000 head of reindeer."

Favourable and extensive grazing areas were found in both the third and fourth sections, that is along the Arctic coast east of Mackenzie river to cape Bathurst and north of Great Bear lake. On the low tundra near Atkinson point, 150 species of flowering plants were found of which 54, or more than 33 per cent, were grasses or sedges, nearly all highly palatable to reindeer. Of the remaining 96 species only 11 were non-palatable, but were not poisonous.

Good winter pasture was found along the edge of the woods, which here skirt the north shore of Great Bear lake and cut across to the Mackenzie delta. Reporting on it Mr. Porsild says:—

"Travelling on foot becomes exceedingly tiresome because the ground is covered with low scrub or heath which grows in a thick soft carpet of mosses and lichens into which one sinks ankle-deep at every step. Willows and other dwarf trees of the tundra dominate the herbaceous vegetation. In sheltered places they no longer hug the ground but grow upright forming little thickets.

"This forage type occupies all the higher ground on both shores of the Eskimo lakes and as winter grazing land ranks with the best. The young shoots of willow and ground birch are much sought after by the reindeer in the fall and early winter, and it is in this kind of winter pasture that the reindeer put on their 'back fat'. The maximum development of the fruticose species of lichens commonly known as reindeer moss is attained in the open timber some distance south of the edge of the woods. Not only is the ground there in places covered with *Cladonias* and *Cetrarias* almost to the entire exclusion of herbaceous species of plant life, but from the dead lower branches of the stunted trees, black and gray *Alectorias* hang in great profusion. The latter form of winter range occupies large areas south of the Eskimo lakes but it attains its greatest perfection in Great Bear Lake district."

A well-defined grazing area was found in Dease valley. The pasture is described as mostly of the browse type with a good intermixture of lichens and sedges in places. Mr. Porsild estimated this area at about 800 square miles and capable of supporting 10,000 to 15,000 head of reindeer.

Another similar area was found in the Dismal Lakes basin which communicates with Dease valley through a low pass. The plateaus that surround this basin are rocky and carry an open alpine vegetation, but in the numerous fertile valleys that intersect them there is excellent summer pasture.

WHITE HEATHER ON NORTHERN PLAINS

The white heather is generally distributed in favourable spots on the Northern Plains and is frequently used as fuel by the Eskimos.

In summing up, Mr. Porsild estimates that there are 15,000 square miles of land suitable for reindeer grazing lying along the Arctic coast and the Eskimo lakes between the Yukon-Alaska boundary and the mouth of Anderson river and extending inland as far as point Separation on the Mackenzie river. On this type of land, he thinks, 40 acres will provide year-round pasture for one reindeer, so that the whole area will carry 250,000 head.

The pasturable country suitable for reindeer north and east of Great Bear lake is described as a triangle, the south edge of which follows the direction of the north shore of the lake from Haldane river eastward to the mouth of the Coppermine, a distance of about 200 miles. The west side is formed by a line running north-northwest about 250 miles from the mouth of Haldane river, Great Bear lake, to Franklin bay on the Arctic coast. The coast from Franklin bay eastward to the mouth of the Coppermine constitutes the third side. The triangle comprises about 38.000 square miles

or about 25,000,000 acres. In this type of country, Mr. Porsild considers, 60 acres should be allowed per head of reindeer and he makes an allowance of 10 per cent for unmapped country covered by lakes and streams. From these deductions the Great Bear Lake area would carry 300,000 head of reindeer.

Further information is given respecting the menace from predatory animals, insect pests, measures for herding and caring for reindeer, transportation facilities and other matters. It is pointed out that wolves are not so numerous along the coast as in the timbered regions but that they are particularly destructive in the Great Bear Lake region. The insect pest is less also within the influence of sea breezes. The full report has been published recently and is obtainable from the North West Territories and Yukon Branch of the Department of the Interior.

PURCHASE OF REINDEER HERD IN ALASKA

The general results of this investigation having indicated that the proposal to establish reindeer herds in the Northwest Territories appear well advised, the Dominion Government immediately took the necessary steps to acquire an initial supply of animals. By an Order in Council of May 1, 1929, the Minister of the Interior was authorized to purchase from Lomen Brothers of Nome, Alaska, 3,000 head of adult reindeer. Under the terms of a contract which was made subsequently, Lomen Brothers agreed to select this number of the largest and most virile animals in their possession, consisting of a proper proportion of males and females, and to deliver them at the Mackenzie delta in the spring of 1931.

A. E. Porsild journeyed to Nome in the fall of 1929 to represent the Government in the selection of this herd and to witness the start of the drive. Herders are now (Spring 1930) driving the deer over the selected route and it is anticipated that by allowing a period of about a year and a half for the drive the animals will find ample opportunity for grazing along the way. R. T. Porsild has charge of the arrangements for the reception and care of the animals on their arrival at the Mackenzie delta.

SURVEYS AND MAPS

Topographical maps of a country or of any part of it can be made only from data secured on the ground respecting its principal physical features. The more accurate are the observations, measurements or records embodying such data, the more nearly can the map be made to be a correct representation of the area involved. Hence the reliability and completeness of a map is restricted to the degree of accuracy of original surveys and to the amount of detail recorded.

The early explorers of Mackenzie District, as those of other areas, had little time or opportunity for making other than rough surveys of the country traversed. Few of them were skilled in making complete astronomical observations for determining their positions, or were equipped with proper surveying instruments for measuring distances or areas. Hence the first maps of the district were very crude and incomplete, and are subject to a considerable degree of revision as more accurate and detailed surveys are made.

A recent example of this is seen in the case of Great Slave lake. For nearly a hundred years, it was represented on maps as outlined by its early explorers. During the years 1922 to 1924, G. H. Blanchet, of the Topographical Surveys, Department of the Interior, made more accurate surveys of it, and the map that resulted was found to reveal many sharp discrepancies from the original map.

FIELD SURVEYS

The surveys of Sir John Franklin, who was a skilled engineer, resulted in a fairly good representation of the northern part of Mackenzie District. He and his associates surveyed routes from Great Slave lake to the mouth of the Coppermine, to Great Bear lake and to the mouth of the Mackenzie. They surveyed also the Arctic coast, first from the mouth of the Coppermine eastward to Kent peninsula, and later west and east from the mouth of the Mackenzie to near the Colville river in Alaska and to the Coppermine. Richardson, Back, Dease, Simpson and Rae made extensive additions to these surveys. All of these men were connected with British scientific expeditions or the great fur trading companies of the day.

RAT RIVER IN RICHARDSON MOUNTAINS

This is a view on the old Mackenzie-Porcupine route to the Klondike followed by many gold seekers.

Half a century later Dominion Government surveyors and geologists entered the field. William Ogilvie, a pioneer Dominion Land Surveyor, in 1888, projected a reconnaissance traverse from the Yukon Territory to the Mackenzie river by way of MacDougall pass and thence up the Mackenzie waterway to connect with previously established points in Alberta. J. W. Tyrrell, Dominion Land Surveyor, surveyed the route leading from Great Slave lake eastwards to Hudson bay by way of the Thelon river. Various other surveys were made by officers of the Geological Survey, reference to which has been made under the heading *Investigations by the*

Department of Mines. For many years the maps resulting from the surveys of these British, fur trading and early Canadian expeditions continued in but little altered form. In fact, comparatively small portions of the district have yet been surveyed in detail.

In 1921 the Topographical Survey Branch, Department of the Interior, undertook an active campaign of surveying and mapping the Mackenzie valley. A control traverse was carried along both banks of the principal waterways from McMurray, in Alberta, to the Arctic coast, including the lower portions of several tributary rivers. The Sixth Meridian of the Dominion Land System of Surveys was extended also as far north as Mackenzie river, meeting it at a point a few miles below Providence.

The Geological Survey of Canada also sent several parties into this field to do geological mapping and the Water Power and Reclamation Service of the Department of the Interior sent engineers into it to investigate and survey some of the principal and most accessible power sites. Officers of the Dominion Observatory of the same Department, with instruments of precision and wireless equipment, determined the astronomical positions of a number of stations on the Mackenzie control traverse.

Land surveys of the following settlements have been made: Fort Smith, Resolution, Hay River, Providence, Simpson, Wrigley, Norman, Good Hope, Arctic Red River, McPherson, Aklavik and Rae. Lots for use in connection with shipping or lumbering industries have been surveyed also at Bell Rock, a few miles below Fort Smith and on Sawmill channel near the mouth of Slave river. A number of individual mineral claims are included also in the surveys of the district.

MAPS

As a result of the surveys of 1921 and following years a number of new maps have been issued on which the outlines of many of the principal physical features of the district are shown in greater detail than formerly. Some of these maps which are in greatest demand are listed below.

The North West Territories and Yukon Branch of the Department of the Interior has issued a general map of the Northwest Territories on a scale of 60 miles to an inch. Besides embodying the latest topographical information, it shows the location of all Royal Canadian Mounted Police posts, radio stations, trading posts operated or maintained by permit, and the boundaries and names of game preserves, sanctuaries or parks. Copies may be obtained on application to the Director of the Branch, Ottawa.

The Topographical Survey Branch, Department of the Interior, issued a series of sheets on a large scale (some 4 miles and others 6 miles to an inch) embracing the Mackenzie waterways from McMurray on the Athabaska river to the Arctic coast. These sheets, in order from south to north, include portions as outlined below. It will be observed that the first three sheets are devoted to territory in Alberta but the whole set forms an excellent chart from actual traverses of the water route from the end of steel to the Arctic coast. The sheets and sections represented are:—No. 1, McMurray to Chipewyan; No. 2, Lake Athabaska; No. 3, Chipewyan to Fort Smith; No. 4, Fort Smith to Resolution; No. 5, Resolution to Windy Point; No. 6, Great Slave Lake (Western Sheet); No. 7, Great Slave Lake (Eastern Sheet); No. 8, Providence to Simpson; No. 9, Simp-

son to Wrigley; No. 10, Wrigley to Norman; No. 11, Norman to Hume River; No. 12, Hume River to Thunder River including Good Hope; No. 13, Thunder River to McPherson and Aklavik; and No. 14, Mackenzie River Delta and Bay.

Another sheet called "Lockhart River Basin" is based on traverses made of Lockhart river, which flows into the east end of Great Slave lake and of the following principal lakes that occur along its course—Artillery, Ptarmigan, Clinton-Colden and Aylmer. The commencement of Back river, which flows from the north end of Aylmer lake, is shown, as well as connections to the Hanbury river on the east and to the Coppermine on the northwest.

Copies of these may be obtained at a nominal price, upon application to the Director of the Topographical Survey Branch, Department of the Interior, Ottawa. Other sheets compiled but not published in lithographed form are "Taltson River Basin," "Headwaters of Tazan and Dubawnt Rivers" and "Alexandra Falls Map." Blue-print or vandyke copies of these may be obtained from the same source.

The Topographical Survey Branch issued also a good map of Northwest Canada which includes Mackenzie District, as do the maps of Canada and maps of Western Canada compiled by the Chief Geographer of of the Department of the Interior and issued by the Natural Resources Intelligence Service.

In connection with the surveying and mapping it must be borne in mind that the introduction of the aeroplane and of aerial photography is revolutionizing former methods of obtaining topographic detail. Planes in a few hours cover territory formerly almost inaccessible and secure photographs that show details of topography more completely and accurately than could be obtained by any other than most costly and prolonged methods. As yet the Dominion Government has not undertaken aerial surveying operations in Mackenzie District but private prospecting organizations have done a certain amount of work in this direction.

THE DISTRICT OF KEEWATIN

GEOGRAPHICAL FEATURES

THE District of Keewatin embraces that part of the mainland of the Northwest Territories lying east of Mackenzie District, with the exception of Boothia and Melville peninsulas. All of the islands in Hudson and James bays are included also in Keewatin District. Exclusive of tidal waters, the total area of the district is 228,160 square miles. Of this area 9,700 square miles are covered by fresh water lakes, leaving a land area of 218,460 square miles. These figures are subject to revision as more precise surveys are made from time to time.

With the exception of the islands in James bay and a small area in the southwest corner of the mainland, Keewatin District lies beyond the northern limit of wooded country. Extensive areas of the Northern Plains are found in this District. They are covered with a prolific growth of grasses, mosses and other northern vegetation that is the support of great numbers of big game animals.

GENERAL RELIEF AND CONTOUR

The general relief of the mainland is low and comparatively level with a gradual slope eastwards to Hudson bay, except along the northerly coast, which drains to the Arctic. The most striking feature of the mainland is a chain of waterways extending across the mid-section from west to east. Commencing at Beverly lake, into which the Thelon and Dubawnt rivers discharge, this waterway includes, in the order named: Aberdeen, Shultz and Baker lakes and Chesterfield inlet.

The Kazan river, flowing from the southwest corner of the District, discharges into Baker lake. On its course it passes through Angikuni and Yathkyed lakes and receives also the waters of Naturawit and Kaminuriak lakes, as well as of several small ones. The southern part of the mainland contains many large and small lakes and streams. Dubawnt lake, which lies on the boundary between Keewatin and Mackenzie, is the largest of these fresh water bodies. Back river, first named "Great Fish" river by Lieutenant Back who explored it, crosses the northwest corner of the District and discharges into Cockburn bay on the Arctic coast. Along its course are found Garry and Franklin lakes.

The shore of Hudson bay forming the east boundary of Keewatin District is featured by a number of deep inlets or bays. Wager bay, off Roes Welcome, is over 150 miles in depth. It has a very narrow mouth and an extreme width of about 30 miles, giving it the nature of a salt water lake. Chesterfield inlet is nearly 125 miles deep. It connects, by navigable channels, with Baker lake, a range of tidal waters reaching well into the lower part of the lake. Inlet and lake together provide over 200 miles of navigable waters.

CHESTERFIELD, KEEWATIN DISTRICT, FROM THE AIR

The low, treeless character of the Northern Plains is shown by this view.

To the south of Chesterfield inlet is Rankin inlet, said to be about 30 miles deep, but, as yet, unsurveyed. Several smaller inlets are found along the coast for about 125 miles south of Rankin inlet. Into these a number of large streams fall. Nearly all of these streams have their origin in large lakes lying in the interior of the District. Numbers of waterfalls are said to be found along their courses.

The north coast is quite irregular. The boundary line between Keewatin and Mackenzie reaches this coast at Queen Maud gulf, and 125 miles or so easterly is Adelaide peninsula, opposite which lies King William island. Then comes a deep inlet into which Back river flows and further east the mainland projects northerly to form Boothia peninsula. The gulf of Boothia and Committee bay then cut deeply into the mainland, being separated by Rae isthmus only from the waters of Roes Welcome. From this isthmus is a large projection of mainland known as Melville peninsula, which, as in the case of Boothia peninsula, has been included in Franklin District.

HUDSON AND JAMES BAYS

Hudson bay, including James bay, measures nearly 1,000 miles from north to south and 600 miles from east to west at its greatest breadth, the total area being about 576,000 square miles. James bay itself is 250 miles from north to south and from 100 to 150 miles wide. The waters of Hudson bay are fairly deep except along parts of its southwestern shore, but those of James bay are quite shallow.

To the north of Hudson bay, Foxe channel leads to Foxe basin and from the basin a lesser channel, Fury and Hecla strait, gives connection to the gulf of Boothia and Arctic waters. Hudson strait, which connects Hudson bay with the Atlantic ocean, is about 500 miles long and has an average width of over 100 miles.

The main body of Hudson bay is quite open, but Southampton island, 200 miles in either direction, lies in its northerly part. Several large islands are found near the outlet to Hudson strait and in the westerly end of the strait. Of these, Coats island and Mansel island, being in Hudson bay, form part of Keewatin District, as do Southampton and a number of smaller islands.

A maze of islands occurs along the easterly coast of Hudson and James bays. Included in this are the Ottawa, Sleepers, Nastapoka and Belcher groups in Hudson bay and Akimiski, Twins and Charlton islands in James bay. The west coast is almost devoid of islands except well to the north where Marble and a few small islands are found.

DISTRIBUTION AND CONDITION OF ESKIMOS

Keewatin District has fewer resident Eskimos than either Franklin or Mackenzie. No Indians make their permanent home in it though a few from northern parts of Manitoba and Saskatchewan occasionally find their way on hunting expeditions as far north as the limit of the wooded areas. The islands in the lower part of James bay are also visited by hunting parties of Indians from the adjacent shores of Ontario and Quebec.

In the general classification of Eskimos those living in Keewatin District were included in two major divisions each of which overlaps parts of Franklin District. These divisions are Hudson Bay and Strait, and Central Arctic.

LOCATIONS AND NUMBERS

On Southampton island, 80 Eskimos were reported in the census of 1927. Along the east coast of Hudson bay there were found in all 665 Eskimos, of whom 100 were on the Belcher islands. As there is considerable movement back and forth between the Quebec mainland and adjacent islands, it is impossible to draw any sharp dividing line that might determine permanent abodes. The distribution extends as far south as Fort George and the following subdivisions with the numbers found in 1927 are: Kingwa, 60; Harrison, 225; Belcher islands, 100; Richmond gulf to cape Jones, 200; cape Jones to Fort George, 50; and Cape Hope islands, 30.

Along the west coast of Hudson bay, 125 Eskimos were reported in the vicinity of Eskimo point, 100 at Chesterfield, 200 about the head of Baker lake, 200 inland along the Kazan river, 40 at the head of Wager bay and 70 in the vicinity of Repulse bay. This latter community extends over part of Melville peninsula which is in Franklin District. In addition to these, 70 Eskimos were reported from Churchill, which is in Manitoba.

In the Central Arctic division three communities were reported on the mainland or north coast of Keewatin District. The location and numbers of these communities were: Pelly bay, 125; Cockburn, 36; and Adelaide peninsula, 50.

Less is known about the conditions of these natives than of those in either the eastern or western parts of the Arctic. It has been reported that they are not so fortunate in respect to a steady food supply as the others, especially those communities that live some distance from the sea and thereby place more dependence on the caribou than on the seal for their sustenance.

In the matter of the establishment of a medical health depot at Chesterfield, a site has been secured and a building erected for a doctor's residence. The medical officer selected will take charge of the depot early in 1930. This will permit the same oversight of the health and economic welfare of the natives as in other districts where depots have been established.

INVESTIGATIONS BY MAJOR L. T. BURWASH

During the summer and autumn of 1927 Major L. T. Burwash, acting under instructions from the Director of the North West Territories and Yukon Branch, made an economic survey of the Eskimos inhabiting the east coast of James bay, the east coast of Hudson bay as far north as Richmond gulf, and adjacent islands, including the Belchers.

The out-going trip to James bay was made by following the Abitibi and Moose rivers from the end of steel on the Temiskaming and Northern Ontario railway, and the return trip by ascending the Mattagami river to Smoky Falls. Canoes, small schooners and the Hudson's Bay Company's power-boat supplied the necessary transport on James and Hudson bays.

The report that resulted contains much valuable information respecting the natives, resources and other features of the areas visited. One of its most interesting parts is that relating to the Eskimos of Cape Hope islands which lie a short distance northwest of the mouth of East Main river. Burwash says of them, in part:—

"To-day they appear to be the most progressive Eskimos in Hudson and James bays. In their present home they have increased in numbers. They are sturdy in appearance and well content with their lot in life. They have built themselves comfortable log cabins and are the only Eskimos of the Eastern Arctic who live in fixed abodes. The men have proved themselves capable boat-builders, carpenters and blacksmiths. Without assistance, in so far as the woodwork is concerned, they have built small schooners from locally grown woods and have installed, maintained and operated gasolene engines in them. Though within the agricultural belt, the Cape Hope islanders have not experimented in agricultural pursuits, although a little assistance and encouragement would, undoubtedly, be productive of good results."

The Belcher Island natives, on the other hand, are reported by Burwash to be living in the most primitive manner of all. His report contains the following extracts in relation to them:—

"These people live under what would appear to be most trying conditions. Their land supplies them with a fair number of white foxes, a few ptarmigan, and waterfowl during the open season. The sea and fresh water lakes supply the greater part of their living and, in spite of the fact that they live on what is little more than barren, storm-swept rocks, they show no signs of degeneration either physically or mentally. While they are in times of stress dependent upon the trade store, they appear to have lost none of their native arts and under normal conditions are capable of living without more outside assistance than their fur catch will buy. The diet of this group of natives conforms more closely to that of the primitive Eskimo than does that of any other group in the Hudson Bay district."

In general Burwash found the health of the Eskimos to compare favourably with that of the Indian population with which they are more or less associated but that there was room for plenty of improvement. The death rate among the younger children was found to be abnormally high. These people were found to be in the process of changing their mode of living from primitive ways to imitations of the white traders with whom they were coming in contact. Losing many advantages of the old before acquiring those of the new, they appeared to be in a somewhat unenviable position, which time, doubtless, will improve.

TRANSPORTATION AND COMMUNICATIONS

After spending a year on the mainland of Keewatin District, G. H. Blanchet recently wrote from his headquarters at Tavane on Mistake bay: "I am being impressed by the fact that for work involving travel the season of operation is much the same as in Franklin's day". In other words, the transportation situation in Keewatin District is in the pioneer stage still.

It may be summed up very briefly under the following six heads: (1) Access to the east coast of Keewatin and the islands in Hudson bay, (2) Access to the Arctic coast of Keewatin, (3) Canoe routes, (4) James bay situation, (5) Nearest railway terminals, and (6) Internal transportation facilities.

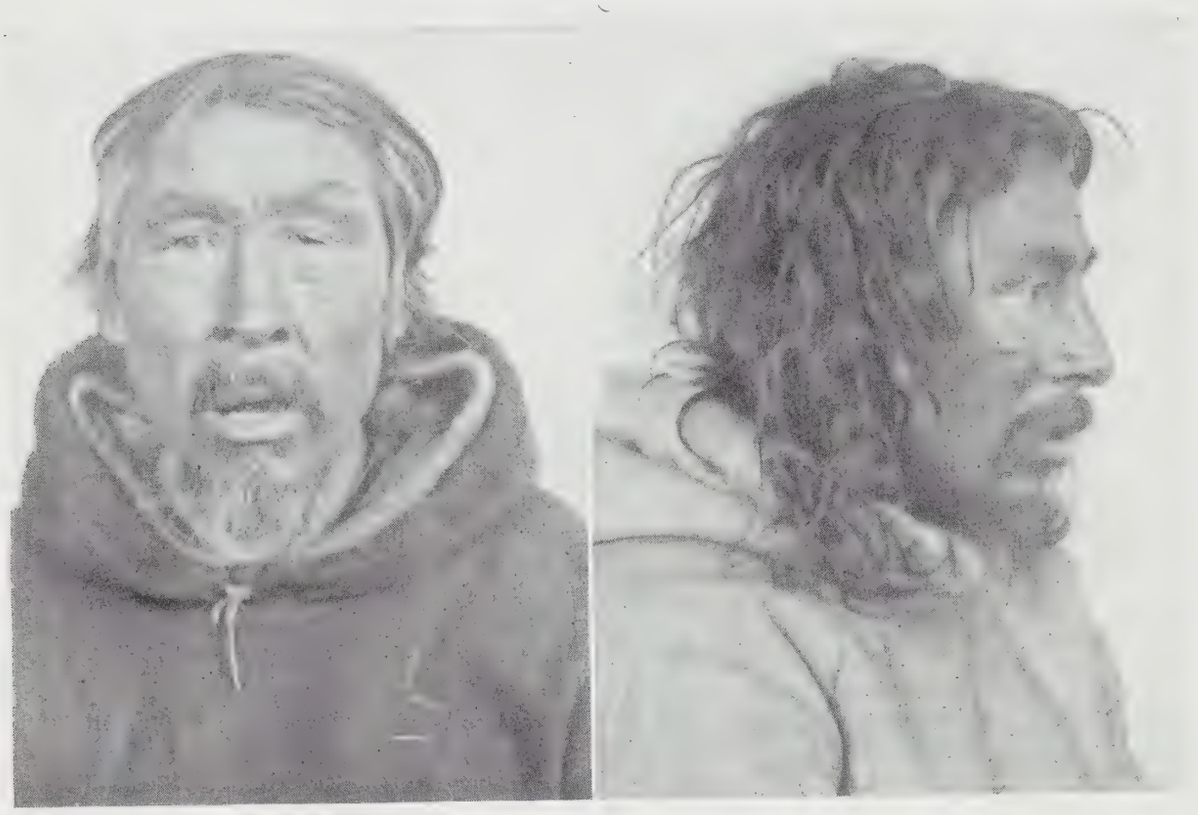
PIONEER TRANSPORTATION CONDITIONS

Ships entering Hudson bay can call, if required, at many of the principal islands and at several points on the mainland coast. The Hudson's Bay Company, as a rule, sends two supply ships a year into the bay. The principal point of call on the mainland of Keewatin is Chesterfield but other places are Eskimo Point and Repulse bay. There are a number of harbours that might be utilized if the occasion arose and one of these at Mistake bay was chosen by the Dominion Explorers Limited expedition of 1928.

Ocean vessels sailing from Vancouver into the Arctic by way of Bering strait have, during recent years, made a practice of going as far east as Cambridge bay on Victoria island. From this point, power schooners relay freight to Peterson bay on King William island and to Boothia peninsula. The Hudson's Bay Company succeeded in getting one boat, the *Fort James* into these waters from the Atlantic. It was thus the first commercial vessel to make the North-West Passage with a cargo of merchandise. Though at present there are no important establishments on the Arctic coast of Keewatin, any that might be established could be served by small power boats from Cambridge bay or Peterson bay.

There is very little canoe travel in Keewatin District but three routes that have been followed by occasional travellers might be mentioned. The first is that from Great Slave lake to Chesterfield inlet by way of the Thelon river and Baker and other connecting lakes. This was the route followed by J. B. and J. W. Tyrrell in 1900. It is described in the section relating to the Thelon game sanctuary. Another route very little used is that from the east end of lake Athabaska to connect with the Thelon route at Beverly lake. It follows mainly the Dubawnt river. Another route, also followed

by very few travellers, is that leading northerly from Reindeer lake in northern Saskatchewan to the Kazan river and thence to Baker lake. Many portages are involved in travelling these waters, both in getting from lake to lake and in passing around rapids and falls. No aids to travel other than Tyrrell's maps have been provided and the difficulties and dangers that beset the canoeist can readily be appreciated.



ESKIMO TYPES OF THE EASTERN ARCTIC

Left, Ma-ow-ya (The Hood); right, Bye and Bye—an intelligent old man living at Repulse bay, Keewatin District.

The islands in James bay are of unusual importance in connection with transportation. The shores of the bay are too shallow to permit of ocean-going vessels landing at the mainland establishments. For many years the Hudson's Bay Company has maintained a depot on Charlton island at which its supply ship calls once a year. Merchandise for the mainland posts is stored here and distributed during the summer season to the various establishments by smaller boats.

There are two well-recognized routes of travel from the interior to the shores of James bay. One might be said to start from Cochrane in northern Ontario and the other from Pagwa, a small station on the Canadian National railway. The route from Cochrane follows the Temiskaming and Northern Ontario railway to the end of steel and thence the Abitibi and Moose rivers to Moose Factory. The other route follows the tributaries of, and the main, Albany river to Fort Albany on the west coast of James bay.

The largest island in James bay is Akimiski. There is a little summer travel between the mainland and it by a few families of Indians. An occasional canoe finds its way from the Lake St. John district of northern

Quebec to Rupert House, on the southeast coast of James bay by way of the Mistissini and Rupert rivers. The Hudson's Bay Company runs a mail packet between Island Falls Junction on the Temiskaming and Northern Ontario railway and Moose Factory, by canoe during the summer months and by dog sleigh during the winter. Ten trips a year are made, one a month excepting for the month of the spring break-up and the month of the winter freeze-up.

The nearest railway point to the mainland of Keewatin District is Churchill. When the Hudson Bay branch of the Canadian National Railways is opened to general traffic, the transportation situation with respect to the mainland of Keewatin will benefit thereby. From Churchill it will be possible to maintain a service during the summer months by coastal vessels to points as far north as Repulse bay.

Keewatin District is favoured by some deep waterways giving access to interior parts. Chesterfield inlet and Baker lake permit power boats drawing up to 12 or 15 feet to penetrate two-thirds of the way across the District. At the west end of Baker lake is Baker Lake post. It is over 200 miles inland from Chesterfield and is served by large power boats. Farther north, Wager bay is navigable for ocean-going vessels, and large power boats can reach a point on its western extremity 150 miles from the main shore. It is from this point that the Hudson's Bay Company has been experimenting with tractors with the view of transporting freight across country to a point on the Arctic coast. There are no improved internal routes of travel in Keewatin District.

LIMITED COMMUNICATIONS

It might be said that as yet Keewatin District has no communication with the outside world except that provided by the yearly visit of the fur trading companies' supply ships. During the past year, however, Dominion Explorers Limited operated a small wireless station and was in frequent touch with the outside. The Royal Canadian Mounted Police detachment at Chesterfield is equipped with a receiving set. Some of the trading posts and missions also have receiving sets.

The wireless stations established by the Department of Marine and Fisheries in connection with the navigating of Hudson strait are located within easy range of Keewatin District. The establishing of a station at Chesterfield to communicate with that at Churchill is a possible development of the near future.

MINERALS AND PROSPECTING

J. W. Tyrrell, who was attached to the Gordon expedition of 1885-86 as hydrographer and meteorological observer, devoted much thought to the mineral possibilities of the shores of Hudson bay, and the publicity he gave the subject through his published works was largely responsible for recent expeditions. With his brother, J. B. Tyrrell, geologist, he crossed the district on two occasions, in 1893 and in 1900. A. P. Low, of the Geological Survey of Canada, spent the winter of 1903-04 near Chesterfield. These

and other scientist visitors drew attention to the fact that the geological formation near Chesterfield appeared favourable as a possible mineral field.

During the summer of 1929, Dr. L. J. Weeks of the Geological Survey of Canada, conducted a geological examination along the shore in the vicinity of Mistake bay and along the lower parts of Ferguson river. His report, as well as those of geologists accompanying private expeditions, have not yet been made public.

PROSPECTING EXPEDITIONS OF 1928-29

Two prospecting expeditions, both with headquarters in Toronto, reached the District of Keewatin by way of Hudson bay in 1928. The first was that of Dominion Explorers Limited, which, sailing from Halifax, N.S., reached Mistake bay on the west coast of Hudson bay early in August. Material and supplies for a base camp, named later Tavane, were discharged and the ship then sailed to Baker Lake post, Chesterfield inlet, and unloaded supplies for a camp there. The expedition was equipped with aeroplanes by the aid of which the prospecting of a large area was carried on.

The other expedition was that of Northern Aerial Minerals Exploration Limited. This party sailed from Saint John, N.B., and established a base at Richmond gulf, on the east side of Hudson bay, opposite the Belcher islands. Materials for a camp and supplies for two years were landed here and prospectors began work in the vicinity. The expedition then sailed across Hudson bay to establish a camp also at Baker lake but the ship was unfortunately wrecked at the entrance to the lake. No lives were lost, and two years' supplies on board were landed and stored. Supplies for this and the Dominion Explorers' expedition were also sent in by rail to Churchill and additional aeroplanes were flown in by way of The Pas, Manitoba. Prospecting was actively pursued during 1929.

UNUSUAL TYPE OF TENT FRAME

This tent frame made of willow wands was constructed by James Bay Indians.

G. H. Blanchet, of the Topographical Survey, Department of the Interior, who was attached as observer to one of these parties, has prepared detailed reports on the results of his investigations.

In 1928 the Nipissing Mining Company, Limited, of Cobalt sent two parties of prospectors into Keewatin District, each consisting of one geologist in charge and three prospectors. The route taken by one party was by canoes from Great Slave lake by way of the Hanbury and Thelon rivers to Chesterfield inlet and thence south along the coast to Rankin inlet. The other party travelled by canoes from the end of steel on the Hudson Bay railway to Churchill, by way of Split lake and Little Churchill and Deer rivers, and then followed the coast north.

Prospecting was carried out during the summer in the general area around Rankin and Dawson inlets and along the coast between them. On September 28th both parties left Term point by plane and reached The Pas during the ensuing week.

During the summer of 1929 prospecting was continued by a party that returned early in the season. The base of operations was Term point and the areas examined included the lower parts of Ferguson river and districts west of Corbett and Rankin inlets.

The Cyril Knight Prospecting Company, Limited, of Toronto, maintained one prospecting party in Keewatin during the seasons of 1928 and 1929. The area under examination lies along the Hudson Bay coast between Eskimo point and Chesterfield inlet.

In 1928 the men went in by rail to the end of steel on the Hudson Bay railway, then followed the Nelson river in canoes to Port Nelson from where they sailed by steamship to Churchill and then completed their journey by canoes. In 1929 the Company's prospectors were taken in by aeroplanes from Cranberry Portage, Manitoba.

IRON-BEARING ROCKS OF NASTAPOKA AND BELCHER ISLANDS

Until recent years the only parts of Keewatin District that attracted the attention of prospectors and mining men were certain islands off the east coast of Hudson bay. The Nastapoka group, consisting of a chain of islands closely paralleling the shore from the mouth of Nastapoka river to Richmond gulf, and the Belcher islands, consisting of four large and many smaller ones lying about 70 miles off shore in the southeast part of Hudson bay, have been known for many years to contain large areas of iron-bearing rocks. From time to time preliminary examinations of these areas have been made and a number of claims have been staked and rights thereto secured.

An expedition headed by A. P. Low, who was for several years attached to the Geological Survey of Canada, staked a number of claims on Gillies and Taylor islands, which form part of the Nastapoka group. Crown grants were issued for these islands in 1903 in favour of the Dominion Development Company, the head office of which is in Philadelphia. The area of Gillies island is 5,799·3 acres and of Taylor island 2,190·2 acres. Geological reports dealing with the iron deposits of these islands were made by Low.

In 1907 further claims were located on other islands forming part of the Nastapoka group. They were surveyed in due course and crown grants were issued for the individual islands. These islands and their areas are,—

Clarke island, 3,019·8 acres; Curran island, 399·7 acres; Armstrong island, 255 acres; Teresa island, 24·1 acres and Camp island, 22·8 acres. The grants were issued in favour of Ungava Miners and Traders Limited.

The Belcher islands were visited in 1914, 1915 and 1916 by R. J. Flaherty, and in 1916 by E. O. Moore, both in the interests of Sir William Mackenzie. Reports and maps published by these investigators drew attention to the possible iron-bearing strata and to the much more extensive area occupied by these islands than shown on former maps.

Twenty-two claims were located in 1916 of which twenty comprise 160 acres each and two about 25 acres each. These claims were later surveyed and leases have been issued in favour of the original locators.

In 1921, G. A. Young of the Geological Survey of Canada made a brief examination of the area. His report, entitled *Iron-Bearing Rocks of Belcher Islands, Hudson Bay*, is published by the Department of Mines as Part E, Summary Report, 1921, Geological Survey.

Young's report verifies earlier statements as to the occurrence of extensive iron-formations which are described as being of a type that in the Mesabi district of the Lake Superior region contains large bodies of high grade iron ore. Five known bands or zones are described and the total estimated land area occupied by the iron-formation and by volcanics overlying the iron-formation is placed at 198 square miles. The total outcropping of the area is said to be not greater than 15 square miles.

While the possibility of deposits of iron ore being found is admitted, it is pointed out in the report that a systematic examination followed by diamond drilling must be carried out before definite information is available. If ore-bodies in commercial quantities are located, the development of adequate transportation services on Hudson and James bays will be necessary factors in the development of mines.

No valuable minerals are known to occur on the islands in James bay. An interesting feature of the west coast of Hudson bay, off the mainland of Keewatin District, is a huge occurrence of beautiful white quartzite on Marble island, which was so named because the early explorers mistook it for marble.

WILD LIFE RESOURCES

Available information respecting the wild life resources of Keewatin District is very fragmentary and incomplete. Practically no biological investigations have been made but various travellers have recorded their observations and experiences concerning the wild life encountered, and from these sources the following notes were secured.

GAME AND FUR-BEARING ANIMALS

The barren-ground caribou is the only big game animal now found in great numbers in Keewatin District. Its range includes the whole of the mainland and Southampton and Coats islands in Hudson bay.

Blanchet reports that during the winter of 1928-29 the caribou were plentiful from 50 miles north of Churchill (Manitoba) to some distance north of Eskimo point, but that they were scarce in the north, particularly about Baker lake. Their northward migration starts about the first of April and their southerly migration during August.

Evidence points to the presence in the lower part of the mainland during certain seasons of the year of a few woodland caribou.

In the report of the Royal Commission that made certain investigations respecting the reindeer and musk-ox in Canada, the present habitat of the musk-ox was described as comprising "that comparatively small region lying north and east of a line extending from Chesterfield inlet on Hudson bay to the western side of Bathurst inlet on Coronation gulf". It would appear that since the date of the issue of this report (1922) the locations of the only known herds of musk-ox on the mainland have been fixed in the vicinity of the junction of the Hanbury and Thelon rivers, in Mackenzie District, about Yathkyed lake, in Keewatin District, and on Boothia peninsula in Franklin District.

ROCK PTARMIGAN ON NEST

The rock ptarmigan is native to nearly all Arctic regions.

Blanchet reports that moose appear to straggle up from the woods occasionally. They have been killed in recent years in the vicinity of Eskimo point, Term point and Baker lake. Only males have been observed.

The principal fur-bearing animal of Keewatin District is the white fox. During the season of 1927-28 nearly 6,000 foxes were trapped in Keewatin District of which all but 50 were whites, the others were blues, crosses and reds.

Ermine were trapped to only about one-tenth the number taken in Franklin District. No white bears were included in that year's returns, but they are said to be plentiful on the ice floes in the vicinity and to the north of Chesterfield. Wolves and wolverines are comparatively scarce in the south part of the District but more numerous in the north.

Other fur-bearing animals that are found sparingly in the interior and wooded parts of the mainland are marten, mink, muskrat and otter.

A few beaver are now on Charlton island in James bay. At one time the Hudson's Bay Company maintained a beaver colony on this island but natives from the Quebec coast were thought to have killed off the stock. Apparently a few beaver escaped and on some of the larger streams found conditions to their liking. Aspen and balsam poplar grow in sufficient quantities to provide food for a limited number of these valuable fur bearers.

Arctic hares are found on the mainland and on the larger islands in the north part of Hudson bay.

BIRD AND AQUATIC LIFE

Ptarmigan and all migratory birds that frequent the Hudsonian and Arctic zones are common in Keewatin District. Spruce grouse are found in the wooded areas.

No commercial fishing has been attempted in the salt waters of Hudson and James bays or in the fresh waters of Keewatin District. A summary of the known fish resources of these waters is included in the section headed *Wild Life*. It is possible that attemps to exploit the waters in the vicinity of Churchill will be made when the Hudson Bay section of the Canadian National Railways is opened to traffic.

Seals are found in both Hudson and James bays. Blanchet reports the walrus as being numerous off the mainland coast of Keewatin. While flying over these waters he frequently observed large numbers. White whales are very plentiful along the coast and the narwhal in the vicinity of Repulse bay. A few right whales are still to be seen.

INVESTIGATIONS AND SURVEYS IN JAMES BAY, 1929

During the summer of 1929, A. E. Porsild, of the North West Territories and Yukon Branch, made a brief botanical examination of Akimiski island and a more complete one of Charlton island, both in James bay, to determine the extent and value of the natural vegetation as food for animals that might be introduced. He found that Akimiski island affords good pasturage for either reindeer or bison and that Charlton island might support a limited number of beaver.

The bird life of Charlton island was found to be very interesting. This island is in the direct path of the migratory flights of many northerly nesting species and is itself the nesting place of numerous eider ducks, terns and other water and shore birds as well as land birds. It has been suggested that it might be advantageously created a bird sanctuary.

On this work Mr. Porsild was accompanied by F. H. Kitto, Dominion Land Surveyor, who laid out a number of lots at House Point on Charlton island where the Hudson's Bay Company has a depot at which its ocean-going vessels call.

The journey to and from James bay was made by following the Abitibi and Moose rivers between the end of steel on the Temiskaming and Northern Ontario railway and Moose Factory.

THE DISTRICT OF FRANKLIN

THE CANADIAN ARCTIC ARCHIPELAGO

PRACTICALLY speaking the District of Franklin and the Canadian Arctic archipelago are synonymous terms. To be precise some slight reservations must be made in this general statement. It has been mentioned that Herschel island is included in the Yukon Territory and that Boothia and Melville peninsulas, which are almost detached from the mainland and are thus more in the nature of islands, are included in Franklin District, as are the islands in Hudson strait.

AREA AND PRINCIPAL ISLANDS

Latest official estimates place the total area of the District at 554,000 square miles of which the land area is quoted at 546,532 square miles and that covered by fresh water bodies at 7,500 square miles. It will be understood readily, when it is remembered that few precise surveys have been made as yet, that these estimates are subject to a considerable degree of revision. In fact the whole area has not been explored thoroughly and new islands are being added to the map from time to time as more intensive field examinations progress.

Many large and innumerable small islands are included in this archipelago. The largest is Baffin, which has an area of approximately 207,610 square miles. Victoria ranks second with 80,450 square miles and Ellesmere third with 78,400 square miles. Banks, Devon, Somerset, Prince of Wales, Melville and Axel Heiberg are all very large islands. Even King William island, which is smaller than any of these, measures about 120 miles from east to west and 100 miles from north to south.

CONTINENTAL RELATION

The Canadian archipelago and Greenland and Iceland form a continuation of the framework of the North American continent. The average northerly boundary of the mainland of the continent might be represented approximately by the 70th parallel of North latitude.

In practically the same latitude as the entrance to Hudson strait is the southern extremity of Greenland, the west outline of which roughly parallels the east outline of Baffin island. The nearest approach of these lands to each other is about 225 miles and that extension of the Atlantic ocean which separates them is known as Davis strait.

North of latitude 70° North, Baffin island swings to the west and the wider body of water lying between its northern portion and the corre-

sponding shore of Greenland is known as Baffin bay. The extreme width of this bay is over 450 miles. Baffin island is practically connected with the main continental body, being separated from Melville peninsula only by a narrow passage called Fury and Hecla strait.

North of Baffin island are Devon and Ellesmere islands, the eastern outlines of which trend to the north and the east. The coast of Greenland opposite Devon island swings sharply to the west, bounding Baffin bay opposite the south end of Ellesmere island. For about 450 miles, from Baffin bay to Lincoln sea, Greenland and Ellesmere islands are separated by a narrow channel, in places not exceeding 10 or 15 miles. The several sections of this channel, from south to north, are Smith sound, Kane basin, Kennedy channel, Hall basin and Robeson channel. Cape Columbia, the most northerly point of Ellesmere island, and of the Canadian Arctic archipelago as known, is in approximate latitude 83° 30′ North and longitude 70° West.

The most easterly point on Baffin island is in approximate longitude 62° West and on or near the Arctic circle. The east coast of Devon island is nearly 18 degrees farther west but the extreme northeast point of Ellesmere island is very nearly in longitude 60° West, which longitude marks the eastern limit of Canada's possessions from the middle of Robeson channel to the North Pole.

North of Alaska, the Yukon Territory and the west part of Mackenzie District, there are a few small islands adjacent to the coast, but in the great expanse of Arctic waters extending to the North Pole no large areas of land have been discovered. But from the vicinity of cape Bathurst, in about longitude 128° West, to Port Burwell on Hudson Strait in longitude 65° West, the Arctic archipelago extends northward to about the same latitude as the north coast of Greenland.

The westerly outline of the Arctic archipelago, as known, follows a fairly regular line, first northerly from cape Bathurst to about latitude 76° North, and then northeasterly to the north extremity of Ellesmere island. The same outline continues in a more easterly direction across the north of Greenland. A glance at a map of the polar regions illustrates that the whole archipelago, including Greenland, might be referred to as the northerly part of the continent, badly cut up by intrusions of the sea, rather than as Arctic waters studded with islands.

DISTRIBUTION AND CONDITION OF ESKIMOS

In the tabular summary of the Eskimo population of Canada, appearing in Part I of this report, five main divisions of territory are quoted. One of these, Baffin Island, is entirely within Franklin District. Three other divisions include parts of this District. They are the Hudson Bay and Strait, Central Arctic, and Western Arctic divisions.

LOCATIONS AND NUMBERS

Four distinct areas of occupation appear on Baffin island. Roughly speaking, they may be described as,—first, South Baffin Island, comprising Frobisher bay, the north coast of Hudson strait, and Amadjuak lake; second, Cumberland Sound area; third, Davis Strait coast; and fourth, the North Coast area.

Three communities were recorded on Frobisher bay having populations respectively of 27, 28 and 140 souls. From Resolution island to Lake Harbour 154 people were found. At Lake Harbour there were 18. Between Lake Harbour and Amadjuak post were 3 communities of 17, 44 and 23 people respectively. Amadjuak had an Eskimo population of 73 and a short distance west was a community of 23. On Foxe peninsula and centering about Cape Dorset post, 200 Eskimos were found, and 27 were located at the time of the census on the shores of Amadjuak lake. These cannot be considered permanent inland residents as all the natives resort to the coast during the greater part of the year. The total for this southern part of Baffin island was 774.

Cumberland sound, though comprising a small area, had a population of 350 natives. They were closely located in 16 communities, the populations of which were respectively, 17, 22, 6, 14, 6, 103, 12, 27, 19, 9, 7, 7, 14, 52, 24 and 11. Pangnirtung, with a native population of 103, is the centre of this division.

NEST AND EGGS OF ROCK PTARMIGAN

Ten eggs to a nest are not uncommon.

Scattered along the shore of Davis strait from Exeter sound to Hamilton bay were 219 Eskimos. They comprised five more or less distinct communities numbering respectively, 29, 45, 9, 11 and 125 people. The largest and more northerly group is located about the mouth of the river Clyde.

On the north shores of Baffin island three communities were found, one at Pond inlet with a population of 35, the second on Milne inlet with a population also of 35 and the third on Admiralty inlet with a population of 100, making a total of 170 for the north part of the island.

In Hudson strait and along the north coast of Quebec, 1,467 Eskimos were reported. It is difficult to apportion this population between the Northwest Territories and the province of Quebec because there is considerable wandering back and forth between the mainland and the islands. Five subdivisions were made of this area. From east to west these subdivisions and the numbers of Eskimos found in each are, Port Burwell, 140; Ungava bay, 702; Wakeham bay, 350; Sugluk inlet, 50, and cape Wolstenholme, 225.

Melville peninsula was included with the west coast of Hudson bay, but, as it forms part of Franklin District, its population might be recorded here. Three communities totalling 255 natives were found. One, of 100 people, is located at the northeast extremity of the peninsula; the second, of 85 people, at the southeast extremity and the third, of 70 people, on Repulse bay to the southwest where Rae isthmus connects Melville peninsula with the mainland. This community should be divided between Franklin and Keewatin Districts.

Another main division was that called Central Arctic which included Boothia peninsula, King William island and the north mainland coast of Keewatin District. In this division 6 subdivisions were made, 3 of which were in Franklin and 3 in Keewatin. The most northerly subdivision centered about Bellot strait which separates Boothia peninsula from Somerset island. The count here was 35. The main part of Boothia peninsula was found to have 135 native inhabitants and King William island 57, making a total of 227 for that part of the Central Arctic included in Franklin District.

Another main division was the Western Arctic which included all Eskimo territory on the coast of Mackenzie District and on adjacent islands in Franklin District. Particulars of this division appear in the section on Mackenzie District under the heading *Native Population.* Of its 16 subdivisions, 5 are in Franklin District, 1 being on Banks island and 4 on Victoria island. Along the southwest coast of Banks island, 60 natives were found. On Victoria island, 20 were found on Minto inlet, 53 on Prince Albert sound, 110 on Wolsten peninsula and 70 in the vicinity of Cambridge bay.

CONDITION

The Baffin Island Eskimos are economically and physically in relatively good condition. They enjoy an abundance of food and are reported by the Chief Medical Health Officer to be in comparatively good health. Scattered along the coast, they find no difficulty in securing an abundance of seals and other aquatic life, which meets their requirements for food, oil and material for satisfying many of their requirements in clothing and housing. The caribou of the mainland provide them with additional stores of food and clothing. Their homes consist of tupeks for the summer and igloos for the winter. The tupek is a crude dwelling constructed by stretching skins or canvas over a framework. It is sometimes used as a winter home by enclosing it in blocks of snow.

The Baffin Island Eskimos received their first lessons in civilization from the whalers, followed by more intensive instruction on the part of missionaries. They nearly all read and write and make use of many

imported supplies and, to a certain extent, of imported food stuffs. Their homes are heated by oil lamps. For winter travel they make use of dogs and sleighs and for summer travel they have whale boats, as well as their own kayaks.

The Central Arctic Eskimos have not experienced the same amount of contact with the white man as those native of Baffin island. They are, consequently, not as advanced in modern methods of hunting and living. The establishment of trading posts and the growing trade in white fox furs is quickly bringing them in line with the rest of their countrymen.

The whole of the Western Arctic is rapidly coming under the influence of civilization that is spreading eastward along the coast from the Mackenzie delta. Owing to the fluctuations in the number of caribou that cross from the Mackenzie mainland to the adjacent Arctic islands, the condition of the natives in this part of Franklin District has been at times somewhat serious. It is hoped that the introduction of reindeer herds now being undertaken by the Government will result eventually in a general betterment of the economic condition of all Western Arctic inhabitants.

ECONOMIC RESOURCES

The wild life of Franklin District represents its only natural resource that has been drawn upon economically to any extent as yet, though there are indications of mineral resources, both metallic and non-metallic. In fact the earliest known record of any attempt to extract mineral resources in Canada is that of a venture based on a supposed discovery of gold on Baffin island.

Franklin District has no forests. Because of its Arctic latitude it has, in effect, no agricultural lands, but it has extensive areas of grazing lands capable of supporting large herds of caribou, musk-oxen or reindeer. Potential water-power resources are widely distributed.

FURS

It has been mentioned that furs are the chief commercial products of the Northwest Territories. The fur trade of the Franklin District centres around the white fox and a chain of posts has been extended recently along the Arctic coast and on Baffin island for the main purpose of securing these pelts. The number of white foxes trapped in Franklin District alone now amounts to over 4,000 a year. Returns for a recent year included also over 100 blue foxes and a few crosses and reds.

Other furs exported from the District are white or polar bears, ermine, wolves and a few coyotes and wolverines. It will be observed that the prevailing colour of the furs obtained in this northern region is white.

GAME

The big game animals of Franklin District are barren-ground caribou and musk-oxen. A few caribou hides are still exported but most of those now secured are used locally for purposes of clothing or sleeping robes. Musk-ox robes formerly constituted an important item in the fur trade

of northern Canada but, in the effort to conserve this valuable animal, as already explained, the musk-ox has been placed on the permanently protected list of game animals.

The range of the barren-ground caribou has been outlined in a preceding section. It would appear that the mainland body, in its northern migration, formerly crossed on the ice to the Western Arctic islands before the spring break-up and summered in great numbers on Victoria, Banks and other islands, returning to the mainland after the fall freeze-up. During recent years the numbers reaching these islands have become less and less.

On Baffin island the caribou remain throughout the year, migrating from place to place. The same state of affairs is found also on Ellesmere island and perhaps in some of the other far northerly parts of the District. The consensus of opinion among travellers to these regions seems to be that the caribou are becoming scarcer year by year.

WILLOW PTARMIGAN VISITING CAMP

Both willow and rock ptarmigan are numerous in the Northwest Territories. Their habitat is circumpolar.

Musk-oxen are known to exist in Franklin District but their numbers and the full extent of their range are imperfectly known. Small herds have been seen and photographed recently by officials of the Annual Canadian Arctic expeditions on Devon island. Others are reported on Ellesmere and Melville islands. A few years ago a few stragglers were reported on Melville peninsula. At present no musk-oxen are known to inhabit the islands

south of Lancaster and Viscount Melville sounds. A few are reported on the northerly parts of Boothia peninsula and it is probable that some may be found on Prince of Wales island.

Of land animals the caribou has held the most important place in the economic life of the natives as a direct source of food, clothing and sleeping robes. The enhanced value that the white fox has acquired by reason of the traders' advent has made it the leading economic animal in commerce.

SEA LIFE

Of sea life, the seal is most important in the economic welfare of the Eskimo. It furnishes him with food, and oil for fuel and light, as well as with skins for boots and other purposes. Next to the seal is the walrus which is in great demand as food for the dogs on which the winter transport depends. The tusks, hide and oil of the walrus are of considerable economic value also and the meat is welcomed by the Eskimos themselves in times of want.

It has been mentioned that whaling was at one time an important industry. The station at Blacklead island in Cumberland sound gave employment to a number of natives and was an important factor in their economic life. It is improbable that this industry will be re-established. Both the white whale and the narwhal are plentiful and are taken by the Eskimos as food for their dogs or for themselves when other sources fail.

Migratory birds and their eggs are taken also as food by the natives. A possible source of revenue is eiderdown, and the eider industry may in time be developed in Franklin District.

Fish for local consumption are taken at nearly all the mouths of rivers, along the coast in little inlets, and in fresh water lakes.

MINERALS

When Sir Martin Frobisher made his first voyage of discovery to Baffin island in 1576 he picked up a piece of rock from the shore of the bay named in his honour which sample, on his return to London, was pronounced by a metallurgist to contain gold. The following year he sailed again with three ships to search for gold in the vicinity where his sample had been obtained. Capacity loads of what later proved to be worthless rocks were carried to England on the return voyage. Before it became known that these rocks did not contain gold, Frobisher sailed for a third time to Baffin island, this time in command of fifteen ships, bent on an ambitious mining scheme. After many hardships and adventures these vessels returned to England with cargoes of supposed valuable gold-bearing ore only to find that the original assay had been deceptive and that the whole mining venture was a failure. This put an end to mineral explorations in the Arctic for many years.

Whaling vessels at later dates reported mica deposits having been observed on Baffin island and elsewhere in adjacent northern waters. An expedition was sent north to investigate these reports and as a result a company opened a mine near Niantilik in Cumberland sound. A narrow gauge railway was laid from the shore to the mica body, a distance of about

a mile and a half inland. For a number of years small quantities of mica in large blocks were mined and exported but the industry proved unprofitable and was discontinued.

Small quantities of graphite have been mined also on Blacklead island, Cumberland sound, the island being so named because of the occurrence of this substance.

It has been mentioned that native copper had early been found along the Coppermine river in Mackenzie District. Samples of copper float have been found on Victoria island, opposite the mouth of the Coppermine river, and it is thought possible that the copper-bearing formation of the mainland may be continued northerly to underlie part of this island.

Lignite coal is known to occur in various localities on several of the Arctic islands. It has been taken from the shore of Melville island. Other occurrences have been observed on Victoria island. The Hudson's Bay Company has mined coal for several years for local uses at a location near Pond inlet on the north end of Baffin island. Outcrops of coal have been observed also on the west coast of Ellesmere island and elsewhere.

The north magnetic pole centres around a point near the west coast of Boothia peninsula.

CANADIAN ARCTIC EXPEDITIONS

In the year 1922 the Department of the Interior, through the North West Territories and Yukon Branch, assumed charge of the annual expedition by steamship to the eastern islands of Franklin District. The object is to further the administration of these outlying possessions by personal contact, to study the condition and requirements of the natives in order that intelligent measures for their general welfare may be formulated, to investigate the natural resources of land and sea, secure meteorological and other scientific data, extend the explorations and surveys of shorelines and in various other ways add to the knowledge of the field and increase the efficiency of its administration.

This work has involved the establishing of local offices or posts at certain strategic points from which police, customs, postal, medical and other services are conducted by resident officials.

EXPEDITION OF 1922

The expedition of 1922 was in charge of J. D. Craig, of the Canadian Section, International Boundary Commission, later Director-General of Surveys, Department of the Interior, and Boundary Commissioner. It sailed from Quebec on the Canadian Government steamer *Arctic,* Captain J. E. Bernier, Master, on July 18th, and cruised as far north as the south end of Ellesmere island or within 830 miles of the North Pole.

Posts were established at Craig Harbour on Ellesmere island, and at Pond Inlet on the northeast coast of Baffin island. Inspector C. E. Wilcox, of the Royal Canadian Mounted Police, and nine men were left in charge of these posts. Supplies for two years were landed in case a vessel might not be able to return sooner. The officers of the expedition collected as much information of a general and scientific nature as the short time at their disposal permitted, and a safe return to Quebec was made on October 2nd.

EXPEDITION OF 1923

The expedition of 1923 left Quebec on July 9, the *Arctic* again being utilized. As in 1922, J. D. Craig was the officer in charge and Captain Bernier commanded the ship. A stipendiary magistrate and a complete court accompanied the expedition for the purpose of conducting the trial at Pond Inlet of an Eskimo charged with the murder of a white trader. Two relief members of the Royal Canadian Mounted Police were included in the outward bound trip. Other members of the expedition included a surveyor, a naturalist, a medical officer, an exploratory engineer, a wireless operator and a cinematographer.

Craig Harbour and Pond Inlet were successfully revisited, a new post was established at Pangnirtung, and examinations were made of sites for other posts. Surveys were made of the sites occupied or selected as government posts as well as of some occupied by fur trading companies. Medical examinations of natives, where possible, were made by the ship's doctor. As much scientific information as time would permit was secured, and pictures to illustrate the nature of the country and the natives were taken freely.

The Exploratory Engineer of the North West Territories and Yukon Branch, Major L. T. Burwash, M. E., remained on Baffin island to continue his investigation during the following year, and two members of the police force who had wintered at the new posts were brought out on the return trip, which was concluded at Quebec on October 4th.

An event of particular interest on this voyage was a visit paid to the Franklin cenotaph on Beechey island. It overlooks Erebus bay, on the southwest coast of Devon island, where the ill-fated Franklin expedition, in search of the North-West Passage, passed the winter of 1845-46.

The staging on the vessel of moving picture shows for the natives was a novel diversion and one apparently very much appreciated.

EXPEDITION OF 1924

The expedition of 1924 was in charge of F. D. Henderson, D.L.S., of the Topographical Survey Branch, Department of the Interior, the surveyor who had accompanied that of the previous year. The *Arctic,* under the command of Captain Bernier, again successfully made the trip, though on the outward bound voyage she narrowly escaped shipwreck. Encountering heavy seas it was found necessary to jettison her deck load after it had shifted and water had flooded the engine room.

A new post was established at Dundas Harbour, on the site selected and surveyed in 1923, and the three posts previously established were successfully revisited. It was found that the main police building at Craig Harbour had been destroyed by fire during the winter. At a later date it was rebuilt. Plans called for the establishment of a new post at a more northerly point on Ellesmere island. On account of ice conditions, it was not found possible to gain access to a desirable site but a cache called Kane Basin was established on Rice strait in latitude 78° 46′ North.

J. D. Soper, naturalist, on the expedition of this and the preceding year, remained on Baffin island to prosecute his studies during the following year, and information was received that Major Burwash was returning to headquarters by a Hudson's Bay Company's ship. The *Arctic* encountered further rough weather on the return trip but reached her dock at Quebec in safety on September 24th.

EXPEDITION OF 1925

The expeditions of 1925-26-27-28 and 29 were in charge of George P. Mackenzie, Arctic Exploration and Development Officer, of the North West Territories and Yukon Branch. The steamer *Arctic,* under Captain Bernier, made her final trip in 1925, as it was found that she was too small and of insufficient power for the work. In that year all the posts were again visited but no new ones were established, ice conditions and shortage of coal preventing an effort to get to Bache peninsula where it was hoped to find a favourable location. Material for the post that it was hoped would be erected there was left at Kane Basin depot and at Dundas Harbour.

The *Arctic* docked at Quebec on October 10th. The concluding paragraph of the report of the Officer in Charge is quoted below.

"Good moving pictures of game animals in the North were secured, as well as pictures illustrating interesting phases of native life. The necessary exchange of police officers at the various detachments in the North was effected, and adequate stores of fuel and supplies were delivered to the posts. Meteorological observations were taken and recorded regularly from the time the ship left Belle Isle strait until her return to the same latitude. Valuable data regarding game in the archipelago were secured. Emergency relief supplies and medical supplies for the natives were left with the police at the different posts. Radio receiving sets were installed and tested at each police detachment. Arrangements were made for a winter patrol from Craig Harbour to Axel Heiberg island. The doctor consulted with the officers in charge of the different police detachments respecting the health of the natives in the area patrolled from the detachments, and gave to all natives requiring it, medical attention, including a major operation on the leg of an Eskimo boy at Pangnirtung. The boy would unquestionably have died had the operation not been performed."

EXPEDITION OF 1926

For the 1926 expedition the ss. *Beothic,* owned by the Job Sealfishery Company, Limited, of St. John's, Newfoundland, was chartered. It is a 2,700-ton, 10-knot steel ship, originally built for the seal-fisheries off Newfoundland and rebuilt in 1925 for Arctic work. The owners provided the Master, Captain E. Falk, and the officers and crew, with the exception of Captain L. D. Morin, formerly first officer on the *Arctic,* who accompanied the expedition as pilot on account of his experience and knowledge of northern waters.

Besides the Officer in Charge and the ship's officers and crew, the expedition included two officers of the Geological Survey of Canada, ship's doctor, secretary to the Officer in Charge, and Corporal Friel and seven constables of the Royal Canadian Mounted Police. The cargo consisted of 1,570 tons of bunker coal and approximately 300 tons of general cargo.

The *Beothic* sailed from North Sydney, Nova Scotia, on July 15. Pond Inlet was reached on the 20th, Dundas Harbour on the 27th and Craig Harbour on the 30th. Rice strait was reached without mishap and the freight left there the previous year was taken aboard. The fourth and successful attempt to establish a post at Bache peninsula is recorded by the Officer in Charge as follows:—

"Early on the 6th, the ship left anchorage at Fram Havn, and with no little misgivings as to the venture into uncharted waters of Buchanan bay, the expedition steamed slowly past Cocked Hat island, past cape Rutherford, past Alexander Haven where Nares on the same date in 1875, exactly fifty-one years before, anchored his ships the *Alert* and *Discovery*. Although a certain amount of heavy ice from Kane basin had crowded into the bay, the year's ice was still holding back the main body and through this ice along the south shore of the bay the ship made fair progress. A favourable lead gave a chance to cross the bay to Bache peninsula and, as progress was made up the bay, ice conditions improved. Eagerly the shore was scanned with binoculars in an attempt to find a possible harbour with good anchorage and a suitable location for a post. Finally a desirable location was found. Here was a well protected harbour, as yet unnamed, about two miles across from point to point, good anchorage and good landing conditions at all stages of the tide. The ship was anchored in 15 fathoms. On going ashore, as favourable a location was found for a post as any in the North—a dry and naturally well drained building location with a southern exposure, well protected from all winds except from the south, with a stream of good water flowing by.

"The new post is on the south side of Bache peninsula, near the entrance to Flager fiord, in latitude 79° 04′ North and longitude 76° 18′ West, a most favourable location from which to patrol the areas to the north and west."

On the southbound trip calls were made at Dundas Harbour, Pond Inlet and Pangnirtung posts. At the latter post Dr. L. J. Weeks, of the Geological Survey, and his assistant remained to conduct investigations during the succeeding year and L. D. Livingstone, M.D., who had accompanied each expedition as ship's doctor, remained and established a temporary medical headquarters for the North West Territories and Yukon Branch.

Inspector C. E. Wilcox and seven members of the Royal Canadian Mounted Police, who had all rendered extended service in the North, returned on leave. North Sydney was reached on August 29.

It is worthy of note that on this trip the ship was in daily communication with headquarters at Ottawa from the time she left North Sydney until her return to that port. This constituted what is believed to have been a record at that date of wireless communication in northern latitudes.

EXPEDITION OF 1927

The expedition of 1927 established a new post on the south shores of Baffin island, about midway along Hudson strait, known as Lake Harbour. This made a total of six posts in the eastern part of the Arctic archipelago, besides Kane Basin cache on Rice strait. The posts from south to north are Lake Harbour, Pangnirtung and Pond Inlet on Baffin island, Dundas Harbour on Devon island and Craig Harbour and Bache on Ellesmere island. Bache is the most northerly post office in the world. Since 1927 no additional posts have been established.

R.C.M.P. POST AT LAKE HARBOUR, BAFFIN ISLAND

Small detachments of Royal Canadian Mounted Police are located at various strategic points throughout the whole of the Northwest Territories.

As in the preceding year the *Beothic* was employed on this trip, sailing from North Sydney on July 16 and returning on September 4. The same officers were in change. As usual, some exchange members of the police force were taken North and those relieved were brought out. Doctor Livingstone also returned by the boat, having made extensive patrols during the preceding winter for the purpose of ascertaining the health of and ministering to the scattered bands of natives. Other government officials who had wintered in the North in pursuit of their investigations were included in the return passage list.

EXPEDITION OF 1928

The establishment of permanent medical headquarters at Pangnirtung featured the expedition of 1928. Doctor Livingstone, Chief Medical Officer of the North West Territories and Yukon Branch, returned to the temporary quarters he had occupied there and supervised the erection of a new building, designed as a hospital and doctor's residence, which he occupied during the ensuing winter.

Ice conditions prevented the ship from getting to Bache but supplies were landed at Kane Basin cache, within twenty-five miles of the main post. As coal, gasolene and other heavy staple necessities were already on hand to the extent of two or three years' requirements, no apprehension was felt for the safety of the detachment stationed there. The supplies left at the cache would be moved the remaining distance by motor boat or dog sleigh as conditions warranted.

All the other posts were visited and reprovisioned. Some moving pictures of musk-oxen were secured on Devon island. The ship, which sailed from North Sydney on July 19, returned safely to that port on September 2.

EXPEDITION OF 1929

The expedition of 1929 was organized and carried out along similar lines to those of preceding years. The *Beothic* was again utilized and the same senior officers were in charge of both expedition and ship. Without going into further detail it may be recorded, in a word, that the purposes of the voyage were successfully and expeditiously carried out.

The return voyage was featured by a side trip across the north of Hudson bay to Chesterfield, on its northwest coast, where material was delivered for the erection of a medical headquarters for that portion of the Northwest Territories bordering on Hudson bay. At this point W. H. B. Hoare, who had been investigating wild life conditions in the Thelon game sanctuary, was taken aboard for the home journey. The return to North Sydney, from which the expedition sailed on July 20, was made on September 3.

Perhaps the most remarkable feature of these expeditions is the success and regularity with which they have been carried out. Arctic explorations have been long associated with records of disaster and mystery. Now a ship sails to a number of fixed objectives in these far northern regions and returns almost as if on schedule. In daily touch with headquarters, its whereabouts and welfare are constantly known. True, it encounters difficulties, each voyage having its own peculiar problems to battle with, and some objectives are not reached every year. But on the whole the main program is usually carried out.

DOMINION GOVERNMENT INVESTIGATIONS

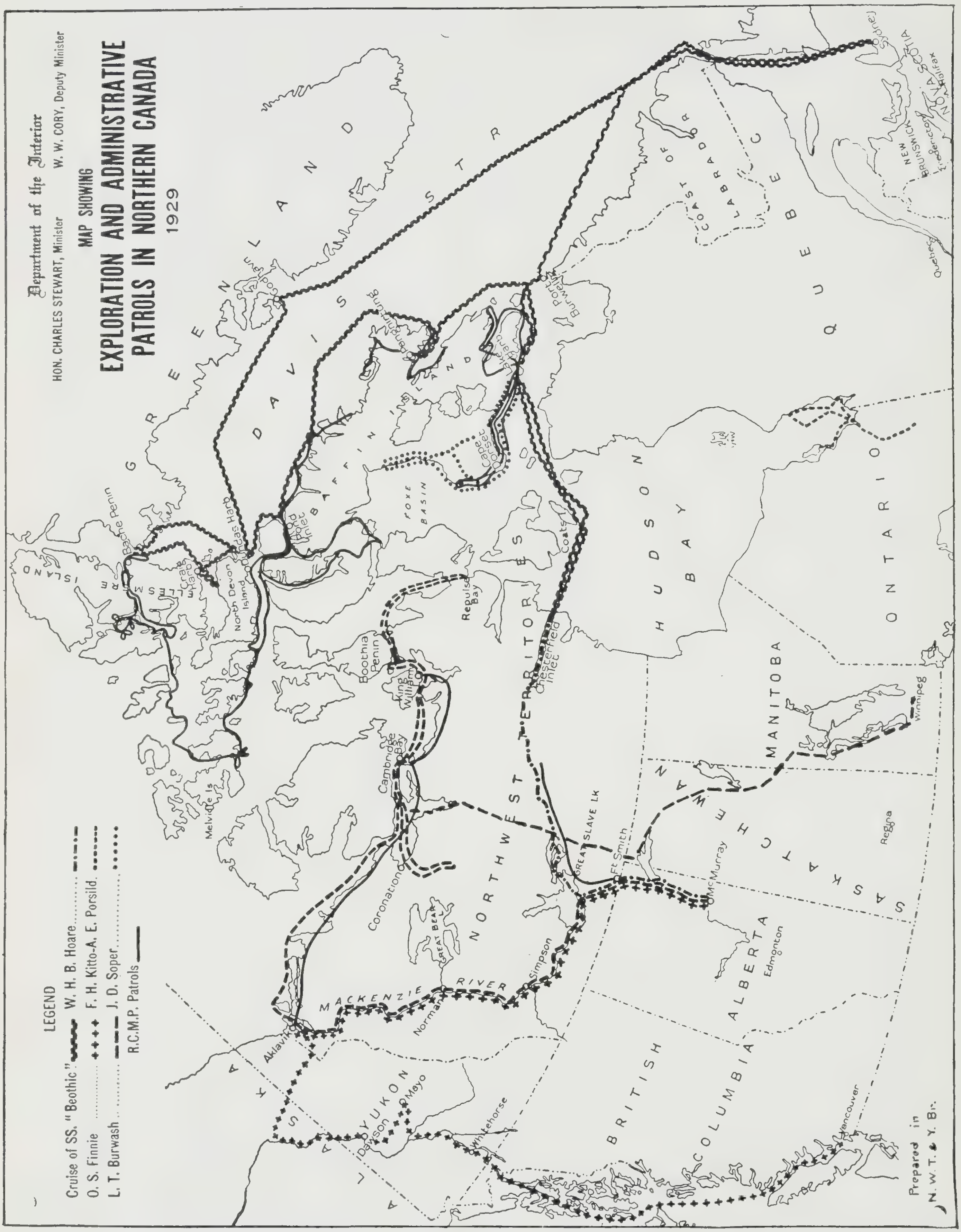
The exploration and investigation of Canada's Arctic regions is too big a subject to be discussed in its entirety here. It will be recalled that Canada assumed from Great Britain possession of these Arctic lands in the year 1880 and it is to the Canadian Government's activities concerning them, and particularly to those of recent years, that reference must be restricted. During this period of nearly half a century many scientific expeditions were sent to various parts of Franklin District, principally to the eastern islands.

The Arctic possessions were placed for a number of years following their acquisition under the particular administration of the Department of Marine and Fisheries and the earliest Canadian expeditions to them were sent out by that department.

EARLY INVESTIGATIONS

In 1884 the *Neptune* was outfitted and sent north under the command of Lieut A. R. Gordon, R.N., for general purposes of administration and investigation. Dr. Robert Bell of the Geological Survey, Department of Mines, accompanied the expedition and did exploratory and scientific work along the south coast of Baffin island.

In 1885 a similar voyage was made with the *Alert* and it was repeated in 1886. As before Gordon was in command and Bell continued his explorations and studies of the geology and natural history of Baffin island.


Department of the Interior
HON. CHARLES STEWART, Minister W. W. CORY, Deputy Minister
MAP SHOWING
EXPLORATION AND ADMINISTRATIVE
PATROLS IN NORTHERN CANADA
1929
LEGEND
Cruise of SS. "Beothic" W. H. B. Hoare
O. S. Finnie F. H. Kitto-A. E. Porsild
L. T. Burwash J. D. Soper
R.C.M.P. Patrols
Prepared in N. W. T. & Y. Br.

In 1897, the *Diana,* under Commander Wm. Wakeham, was sent north and visited Cumberland sound on the east coast of Baffin island. Doctor Bell again accompanied the northern expedition and did considerable scientific work in the vicinity of Cumberland sound.

An expedition under the command of A. P. Low, of the Geological Survey, sailed north on the *Neptune* in 1903 and during that and the following two years devoted much time to the study of navigation in Hudson strait and Hudson bay and to the geology and natural history of adjacent lands.

Captain J. E. Bernier, with the *Arctic,* made three voyages to the Eastern Arctic for the Department of Marine and Fisheries. The first was in 1906, returning in 1907; the second in 1908, returning in 1909; and the third in 1910.

The Canadian Hydrographic Service has sent several expeditions to Hudson bay and strait. Commander I. B. Miles, R.N., led one in 1910 on board the *Stanley.* H. D. Parizeau carried on work with a schooner in 1910, 1911 and 1912. Capt. F. Anderson led the expeditions of 1911 and 1912 with the *Minto* and those of 1913 and 1914 with the *Acadia.* The *Acadia* was again sent to these waters in 1929 under the command of J. U. Beauchemin.

Reports of all these expeditions have been published by the Department of Marine and Fisheries. The reports of Bell and Low on their scientific work are contained in the annual reports of the Geological Survey.

During the war years no expeditions were sent into the Hudson Bay or Eastern Arctic regions but in the Western Arctic the Canadian Arctic expedition of 1913-18 led by the explorer, V. Stefansson, carried out extensive scientific investigations. The work was divided between the Arctic islands and the mainland. The mainland, or southern party, was headed by Dr. R. M. Anderson of the Department of Mines and the scientific personnel consisted almost entirely of officers of that Department. The northern party was in direct charge of Stefansson himself. During this time he travelled extensively over the Western Arctic islands and adjacent waters.

INVESTIGATIONS OF 1922-29

The annual expeditions of 1922 to 1929 enabled several special investigations in the eastern Arctic to be conducted by officers of the Department of the Interior and the Department of Mines and by the Royal Canadian Mounted Police. Those who conducted the principal undertakings are Major L. T. Burwash, Exploratory Engineer, L. D. Livingstone, M.D., Chief Medical Health Officer, and J. Dewey Soper, Investigator (biological), all of the North West Territories and Yukon Branch; Dr. L. J. Weeks of the Geological Survey, Department of Mines; Dr. R. M. Anderson, Chief, Biological Division, Department of Mines, and Dr. M. O. Malte, Chief Botanist and P. A. Taverner, Ornithologist, National Museum of Canada, as well as several members of the Royal Canadian Mounted Police organization.

Summaries of the investigations by Burwash and Livingstone, as well as those by Soper since 1926, on Baffin island, are given in sections that follow. Burwash also made two extended journeys in the western Arctic on which he visited Victoria, King William and other islands and Boothia

peninsula. His work in these instances has been referred to in the section relating to the native population of Mackenzie District. Space does not permit narrating the many patrols successfully carried out by the Royal Canadian Mounted Police in Franklin District but one of the most arduous and extensive, that performed by Inspector A. H. Joy in 1929, is outlined in a following section.

J. Dewey Soper accompanied the expedition of 1923 as Junior Biologist for the Department of Mines and made studies at the various point of call to the extent that his limited time permitted. In 1924 he went north again for the same Department and remained on Baffin island until the return of the expedition of 1926. The report of his work in these instances has been published by the National Museum of Canada (Department of Mines) under the title *A Faunal Investigation of Southern Baffin Island.*

Dr. L. J. Weeks, Geologist, accompanied the expedition of 1925, making such preliminary investigations of the geology of the country in the vicinities of the various points of call as time would permit. He returned north the following year and, establishing headquarters at Pangnirtung, spent the winter of 1926-27 in making a geological examination of the Cumberland Sound area.

Dr. M. O. Malte, Chief Botanist, National Museum of Canada, made two trips to the North. In 1927 he accompanied the Canadian Arctic Expedition to the Eastern Arctic and in 1928 he made the round trip to Hudson bay on board the Hudson's Bay Company's supply ship, the *Nascopie.* Botanical explorations were made at the several points of call. Doctor Malte was successful in obtaining a large and varied collection of Arctic species.

Dr. R. M. Anderson, Chief, Biological Division, National Museum of Canada, made the round trip with the Canadian Arctic Expedition of 1928. At the various points of call as far north as Ellesmere island he made biological investigations and was able to secure a good collection of specimens.

P. A. Taverner, Ornithologist, National Museum of Canada, accompanied the Canadian Arctic Expedition of 1929. Opportunity was taken of the various calls ashore to study the bird life; and museum specimens of birds and eggs were collected.

INVESTIGATIONS ON BAFFIN ISLAND BY MAJOR L. T. BURWASH

Major Burwash sailed with the expedition of 1923 and landed at Pangnirtung on the return trip on September 11th, which point he made his base. From the date of landing till March 12th, 1924, the time was spent in and around Cumberland sound in observing the economic conditions of the natives, studying the wild life and investigating the natural resources of the country. A total distance of approximately 1,500 miles was travelled by dog team while engaged on this work.

A month was then spent in making a preliminary trip inland as far as a point on the south shore of Nettilling lake. Bases were established and caches of seal and caribou meat were stored up in preparation for a more extensive trip.

On April 10, Major Burwash, accompanied by three Eskimos, left the main base on Cumberland sound and set out with Amadjuak post, which is located on the south coast of Baffin island, as immediate objective. For transport, one sled, 15 feet in length, and 16 dogs were used.

In spite of stormy weather and heavy travelling on account of deep snow, this objective was reached in 19 days.

After a short stay at Amadjuak the journey was continued along the shore ice to cape Dorset, which is located on the mid-southerly shore of Foxe peninsula and at the northwesterly extremity of Hudson strait. This point was reached on May 4, the whole trip across Baffin island being accomplished in 23 days travelling time.

A compass survey of the route followed was carried out from Cumberland sound to Mingo lake, a distance of about 300 miles. From Mingo lake the route to Amadjuak had been surveyed previously.

During June, July and August of 1924 a traverse was made of the coastline along the southwest part of Baffin island and sketch maps were made of Mill and Salisbury islands.

The results of Burwash's surveys disclosed, among other inaccuracies on existing maps, that there were two large lakes only along his route instead of three as shown. The large lakes are Nettilling and Amadjuak. Mingo lake is comparatively much smaller and there are numerous lesser ones.

On August 20 the party left Dorset on the Hudson's Bay Company's boat, the *Bayeskimo,* and transferring at lake Harbour to the *Nascopie* returned to Pangnirtung where the natives rejoined their families. Major Burwash then returned south on the homeward voyage of the *Nascopie.*

The results of this work included the obtaining of valuable data respecting the economic conditions of the Baffin Island Eskimos, the wild life and game resources of the land, the fur trade, the industrial possibilities and the sea life. Sketch maps of the country traversed were made as well as notes on its geology and topography.

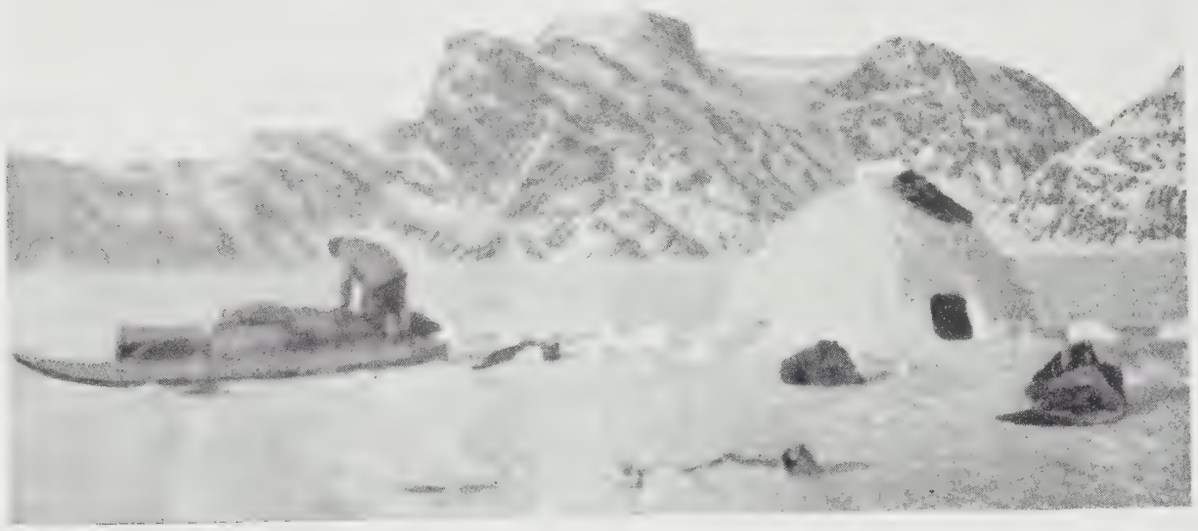
SURVEY OF HEALTH OF BAFFIN ISLAND ESKIMOS BY L. D. LIVINGSTONE, M.D.

L. D. Livingstone, M.D., accompanied the Canadian Arctic Expedition of 1926 and on the return voyage disembarked at Pangnirtung. He and Dr. L. J. Weeks of the Geological Survey constructed a small residence as joint headquarters for the winter. For the first few months Doctor Livingstone's time was occupied with medical work in this vicinity and in the early winter this work was extended by a few short trips about the gulf.

In February Doctor Livingstone set out with Corporal Friel of the Royal Canadian Mounted Police for the south coast. They followed the west shore of Cumberland sound, visiting all the native settlements on the way and reached Sinyah, the eastern entrance to Frobisher bay, on March 1. Passing into Frobisher bay they visited the various settlements around it and then made a land crossing over to Hudson strait. Lake Harbour was reached in good time where a short stay was made. The party then set out along Hudson strait for Amadjuak which was reached in 6 days. Here the party re-outfitted and rested their dogs, after which they set out for Cumberland sound by way of the interior.

The return route followed a series of lakes from Amadjuak post to Mingo lake. A land crossing of about 6 miles then led from Mingo lake to Amadjuak lake, the south side of which was traversed on a due east course. Two and a half days' travelling overland then brought the party to a large river flowing north which was followed to Nettilling fiord and Pangnirtung. The return trip from Amadjuak, on Hudson strait, was made in 9 days, and the whole trip of 1,100 miles in 52 days.

Doctor Livingstone then made a short trip to Oshaluk, about 30 miles from Pangnirtung. On his return, preparations were made for a long trip to the northern part of Baffin island.



ESKIMO SNOW HOUSE OR IGLOO

The igloo is still used extensively as a winter home, and dog sleighs furnish means of winter transportation. Scene on Baffin island.

With an Eskimo driver and 19 dogs he set out from Pangnirtung on April 25. Crossing over to Davis strait by way of Kingnait pass, the party followed the coast northwards. Native settlements at Padle, Kivitoo, Home Bay and Clyde were visited on the way. Deep snow in places proved too much for the dogs and during the latter part of the trip slow progress was made.

More than half of the dogs perished but the objective, Pond inlet, was reached on June 5. The total distance travelled between Pangnirtung and Pond inlet was 1,028 miles and the time occupied 42 days.

On June 24 Doctor Livingstone and his Eskimo left Pond inlet to visit the natives on Navy Board inlet. They first crossed to Bylot island, then crossed Eclipse sound and followed the west side of Navy Board inlet northward to Low point. The Eskimos of that vicinity were encountered on the ice and, after a brief visit with them, the return trip was made by way of Bylot island, Pond inlet being reached on July 2.

During these various patrols a systematic examination of the people was made and of their health, mode of living, foods and habits. During

the season about 1,200 natives were visited. Doctor Livingstone reports that on these patrols of 1926-27 throughout Baffin island he found the Eskimos, physically and economically, to be in good condition.

Much of the territory traversed was unexplored, especially those parts lying between Mingo lake and Nettilling fiord and on the east coast between Scott inlet and Pond inlet. Rough compass surveys and sketches of the routes followed were made.

SURVEYS AND BIOLOGICAL INVESTIGATIONS BY J. DEWEY SOPER ON BAFFIN ISLAND

In 1928 Mr. Soper returned to Baffin island under the auspices of the North West Territories and Yukon Branch of the Department of the Interior. His instructions were to carry on surveys in the little-known Foxe peninsula, to investigate wild life conditions and to discover, if possible, the breeding grounds of the Blue Goose.

Taking passage on the Hudson's Bay Company's supply ship, the *Nascopie*, Mr. Soper arrived at cape Dorset on August 5 and established headquarters there for the year. He then set out with a party of Eskimos and succeeded by early September in making an exploratory survey of the coast from cape Dorset to cape Dorchester in latitude 65° 26′ North. The remainder of the fall, until the freeze-up in mid-October, was devoted to exploring and mapping the coast eastward to Andrew Gordon bay, and north through a chain of lakes in the interior of Foxe peninsula to latitude 65° 03′ North. This resulted in placing on the maps, in considerable detail, a series of eight lakes not known previously to exist, as well as a new interpretation of the entire coastline from cape Dorchester to Andrew Gordon bay. The work to the beginning of winter involved over 1,000 miles of travel.

The winter was given over to traversing and mapping Foxe peninsula, which had not been travelled over previously by a white man. A great deal of topographical detail was secured, including that of many lakes and a river not previously known.

On March 11, Mr. Soper left cape Dorset to survey the west coast of Baffin island north of Bowman bay. His expedition included 5 Eskimo drivers, 5 sledges and 68 dogs, hauling a total of 4,200 pounds of food and equipment. The route lay along Hudson strait to Andrew Gordon bay, thence by way of a chain of lakes to Ungmalooktuk lake and across Foxe peninsula to the southeastern extremity of Bowman bay. The west coast of Baffin island was then followed and mapped as far as the mouth of Hantzsch river in latitude 67° 33′ North, and the survey was carried for 32 miles up this river.

On the return journey the western limit of the limestone highlands north of the Koukdjuak river was mapped and a side trip of exploration was made from Bowman bay to the Putnam highland. A portion of the north coast of Foxe peninsula was then mapped to the west and a new traverse was carried across Foxe peninsula to Andrew Gordon bay. Further surveys were made on Foxe peninsula and the party returned to cape Dorset on April 14th, after having travelled a total distance of about 900 miles.

It was necessary to carry food for the entire duration of this journey. This was accomplished by establishing depots at long intervals and returning the native drivers one by one until the highest latitude was reached. The last 600 miles were covered with one Eskimo companion and one dog team.

An expedition for the discovery of the breeding grounds of the Blue Goose, reported to be near Andrew Gordon bay, was then undertaken. Cape Dorset was again left on May 17, 1929, with 6 Eskimos, 4 dog teams and sledges and food and equipment to last for 3 months in the interior. In-

BLUE GOOSE ON NEST

The nesting ground of the blue goose was discovered in 1929 by J. Dewey Soper, of the North West Territories and Yukon Branch, and is located near Bowman bay, on Baffin island.

cluded was a large canoe with which to navigate Foxe basin the following summer and to cross Foxe peninsula by way of lakes and rivers to Hudson strait.

After eight days hard travel the party reached the proposed site of their summer headquarters near Bowman bay, in latitude 65° 35′ North. This was named Camp Kungovik after the Eskimo name for the Blue Goose. All the dogs and all but 2 of the Eskimos were then sent back to cape Dorset.

Mr. Soper then spent two months at Camp Kungovik, during which time the breeding ground of the Blue Goose was discovered. Scientific collections were made and a thorough study of the habits of this bird on its summer range was carried out.

The return journey was commenced on July 20th, and after a struggle of 28 days with the ice of Foxe basin and across the interior, cape Dorset was reached in safety. An additional voyage of 360 miles was necessary to connect with the *Beothic* at Lake Harbour and the return to civilization was made on it after an absence of 14 months. The survey work alone involved a total of 2,300 miles of travelling on Baffin island.

NEST AND EGGS OF BLUE GOOSE

The nests are built of grass and moss on low, marshy ground, and from 2 to 5 eggs constitute a setting.

During the course of this expedition special attention was given to a critical study of the fauna of Foxe peninsula. To this end intensive collecting of both birds and mammals was pursued, which yielded a total of 512 museum specimens. The scientific data acquired includes much material relating to the Blue Goose (*Chen caerulescens*). Several new ornithological records were added to the list of the Baffin Island fauna.

ARCTIC PATROL OF 1929 BY INSPECTOR A. H. JOY, R.C.M.P.

Brief reference has been made to the patrol work of the Royal Canadian Mounted Police. Those patrols carried out in Franklin District by members of the Eastern Arctic detachments are of unusual interest because of the wealth of original information that they produce. The reports of the officers and men who carry out these undertakings constitute valuable contributions to science, adding materially to the world's knowledge of the geography and natural history of these Arctic regions.

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Because of the recent date of its execution, the patrol by Inspector Joy in the early months of 1929 is particularly interesting. Passing reference to other typical ones might be made before proceeding with it.

Sergeant J. E. F. Wight and Constable T. H. Treadgold, of the Pangnirtung detachment, made a patrol of 1,286 miles in 1926 from Pangnirtung to Lake Harbour and return. With Eskimo guides they set out on February 15th and travelled across the interior of the south part of Baffin island, crossing areas that were unknown even to the guides. The purpose of this patrol was to obtain general information and to enquire into a case of alleged murder. The round trip was completed successfully on May 2nd.

In 1927, Inspector (then Staff-Sergeant) Joy made a remarkable journey of over 1,300 miles from Bache post, across Ellesmere island and to the Axel Heiberg, Sverdrup, King Christian, Cornwall and Graham islands. He was accompanied part of the way by Constable Garnett but the greater portion of the journey was made in the company of two Eskimos. The total time involved was 54 days, from March 26 to May 18.

Inspector C. E. Wilcox made a patrol of some 900 miles in 1928 from Pond inlet, on the north coast of Baffin island, to Fury and Hecla strait. He left Pond inlet on February 20 and returned on April 4, having been absent for 45 days. He was accompanied by 3 natives and 2 dog teams and carried supplies for 50 days.

The Arctic patrol of 1929 by Inspector Joy must go on record as one of the most remarkable and successful Arctic journeys made in recent years by the Royal Canadian Mounted Police. Perhaps the most unusual phase of it, considering the times, was the total lack of publicity concerning it. The whole expedition was undertaken and carried to a successful termination before the news of it reached the outside world.

On March 12, Inspector Joy left detachment headquarters at Dundas Harbour on the south coast of Devon island with Constable Taggart and 1 Eskimo and 2 dog teams as his main support and Constable Hamilton and another Eskimo with a third dog team as reinforcements for a few days. On May 31 he arrived at Bache detachment headquarters on the southeast coast of Ellesmere island after having made a successful patrol of over 1,700 miles in 81 days that took his little party by a circuitous route over a vast area of the northerly part of the Canadian Arctic archipelago. This was his third extensive patrol in the Arctic.

The route might be described roughly as running first westerly to Winter harbour, on Melville island, then northerly to Hecla and Griper bay, and then northeasterly to Bache. The following principal islands were visited: Devon, Cornwallis, Bathurst, Melville, Lougheed, Edmund Walker, King Christian, Ellef Ringnes, Cornwall, Axel Heiberg and Ellesmere.

The whole area traversed lies far north of the Arctic circle. In fact no point on the route followed is below latitude 74° 30′ North and the ending of it, Bache, is a little north of latitude 79° North. In longitude, the party covered about 35 degrees, the extreme west and east points of the route, Winter Harbour and Bache, being in approximate longitudes 111° and 76° West respectively.

Some of the difficulties of travel can be visualized by reading between the lines of the report. At the very beginning of the trip soft, deep snow

was encountered and for several hours the progress of the little party did not exceed one mile an hour in spite of the utmost exertion on the part of both men and dogs. Then came many miles of rough travelling along the coast, with steep, rocky cliffs on the one hand and a wall of ice from 20 to 100 feet high, that had been pushed up by the floe in Lancaster sound, on the other. A great deal of rough ice was encountered. In places the shore ice sloped sharply to seaward and was broken by numerous fissures into which the runners of the sleighs repeatedly slipped, in some instances being broken as a result. Overland travel presented its difficulties also and one of the features of the whole trip was the descent of the glacier at the head of Beitstad fiord, near Bache, which was made by the aid of ropes.

Considerable stormy weather was encountered as well as clear days with stiff, cold winds and days when the fog was very heavy. For days at a time the men's clothing was wet and frozen and could not be dried out owing to lack of fuel. The rough ice made the dogs' feet sore and one dog perished. Fortunately, the supplies proved ample and at no time were either men or dogs short of food. An attack on their camp was made one night by a polar bear and the men killed it only after an exciting battle.

Some points or sections visited were of particular interest. A short stop was made at Beechey island, which will always be associated with the Franklin expedition that wintered there in 1845-46. Near by, Inspector Joy reports the remains of some Eskimo stone igloos. On Cornwallis island a cairn was observed and from it was secured a record dated August 8, 1850, by Commander William Penny of H.M.S. *Lady Franklin* and *Sofia*. At Dealy island were found the remains of a cache deposited during the winter of 1852-53 by Commanders Kellett and M'Clintock, then in search of Sir John Franklin. At Winter Harbour, on the south coast of Melville island, is a Canadian Government shack containing a quantity of stores. This cache was established by Capt. Bernier in 1908-09 and visited by Stefansson in 1917. The greater part of the stores was in fair condition.

One of the most interesting items of Inspector Joy's diary is an entry made on April 28, when he was camped at the head of Hecla and Griper bay, to the effect that the sun did not go below the horizon during the full 24-hour period.

On this patrol Inspector Joy made many side excursions to examine interior parts of the islands visited, in some instances erecting cairns to mark his visits. His diary contains many references to the natural resources and geographical features he observed.

Polar bears were found in plenty along Lancaster sound, Barrow strait and Viscount Melville sound, and in smaller numbers after passing Cornwall island. Many references are made to caribou, particularly as being observed on Melville island and on most of the islands between it and the end of the journey. A fairly large herd of musk-oxen was seen at the head of Bridgeport inlet on Melville island and numerous smaller herds were encountered on Axel Heiberg island and on the west part of Ellesmere island. A couple of seals were killed on Wolf fiord, Axel Heiberg island. Hares were observed during the last part of the journey and wolves here and there all along the way.

VIRGINIA FALLS, SOUTH NAHANNI RIVER

These falls were explored in 1928 by Fenley Hunter, Long Island, N.Y. They have a drop of 315 feet and are located on the South Nahanni river, Mackenzie District, 122 miles above its junction with the Liard.

Vegetation was reported quite plentiful on Edmund Walker island and coal was found lying on the surface there.

An interesting description of Vesey Hamilton island is given. This island is said to be of a very remarkable formation, consisting of a series of high, bare hills having sharp peaks and steep slopes, intercepted by narrow ravines. Inspector Joy says it has the appearance of a miniature Rocky Mountain area.

THE BEAR MAKES HIS MARK

Photo taken in Wood Buffalo Park, showing claw marks on poplar tree recently climbed by a bear.